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THE
BUTTERFLIES OF NORTH AMERICA:

BY

WM. H. EDWARDS,
MEMBER OF THE AMERICAN ENTOMOLOGICAL SOCIETY.

PHILADELPHIA:
THE AMERICAN ENTOMOLOGICAL SOCIETY,
1868—1872.

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There be Insects with little hornes proaking out before their eyes, but weake and tender they be, and good for nothing; as the Butterflies.—*Pliny; Phil. Holland's Trans.*

Many Insects there be that breed after another sort; and principally of dew, which setleth upon the Radish leafe. From it ariseth a little grub, and lo in process and tract of time it groweth bigger and gathereth an hard huske about her. This is called Chrysalis; and after some time, when the huske is broken, he proveth a faire flying Butterflie.—*Ibid.*

PREFACE.

On completing the present Volume, I have little to add, by way of Preface, to the Advertisement that accompanied the first Part. I have endeavored to make the work in some degree worthy the beautiful forms it represents, and to this end have been fortunate in the co-operation of an accurate artist and careful colorists. To Mr. E. T. Cresson, the late Corresponding Secretary of the American Entomological Society, I am under obligation for his constant supervision in all departments, and in the printing and publishing especially. From many lepidopterists whose names will be found mentioned, I have received kindly aid and generous use of specimens.

It has been a delight to make known the charming loiterers of our mountains and forests and fields, the study of whose ways has long been to me a recreation and a constant pleasure such as naturalists only can appreciate and perhaps comprehend. Works of this class, if faithfully executed, cannot be remunerative in a pecuniary sense, and the preparation of them must be strictly a labor of love. For this reason, it has been the more gratifying to have received from my subscribers frequent assurances of satisfaction as the several Parts have appeared, and expressions of approval and encouragement from entomologists and naturalists whose estimation I highly value. This has chiefly determined me to continue publication, which I am the more willing to do, as many long known species of our butterflies still remain unfigured and the number of new ones increases with surprising rapidity. Nearly one hundred have been brought to notice during the past twelve months, a large part of which are the results of one season's intelligent collecting in Colorado, by Mr. Mead, and the total number catalogued in the Synopsis now exceeds five hundred. It is useless for illustration to attempt to keep pace with discovery in these circumstances, and in such a world as this continent affords, but some effort should be made lest the very wealth of species prove a hindrance to the study of this branch of natural history, for nothing is more perplexing and discouraging to the beginner than dry, unillustrated descriptions. I hope therefore to commence Volume II in course of the next few months.

W. H. EDWARDS.

Coalburgh, on the Kanawha River, West Virginia, June 1, 1872.



ADVERTISEMENT.

SINCE the publication of Boisduval and LeConte's *Lepidopteres de l'Amerique Septentrionale*, 1833, in which the greater number of Butterflies of the United States were described and figured, mostly from the plates of Abbot, there have been added to our fauna, and to our knowledge, partly from the enlargement of the States and partly from the observations of later naturalists, almost or quite as many as were then known. California and the Pacific slope and the Rocky Mountains have proved exceedingly rich in species. The same is true of Texas and of the northern parts of the continent. And, wherever a lepidopterist has carefully collected in the old States, and in localities supposed to have been thoroughly worked, new species, many of them conspicuous for size and beauty, have been discovered.

Many Californian species were described by Dr. Boisduval, in the *Ann. Soc. Ent. de France*, none of which have been figured, except two or three in Doubleday's *Genera*. Kirby described and figured a few of the Northern species in his *Fauna Boreali Amer.* in 1837, and many descriptions, with occasionally a plate, are scattered through scientific journals and Proceedings of Societies.

Nearly all the early descriptions are defective in certainty, being too brief, or too carelessly written, to enable us to identify the species, often applying to two or more as well as one, and often being utterly irreconizable. Having, from my first study of this beautiful family, felt the want of illustrations, I long ago proposed to myself to publish a complete work on the Butterflies of North America, when I should have amassed sufficient material and could command the leisure necessary to such an end. I have the material, but I have not the wished for leisure, and I am compelled at present to forego the more ambitious attempt. But to carry out, even to a moderate degree, my cherished desire, as well as to enable our lepidopterists to keep up somewhat with the advance of the study, I propose now to publish a sufficient number of new, or hitherto unfigured or disputed, species, to make at least a moderate volume, leaving it for the future to decide whether I will continue beyond that limit. One number, therefore, containing at least five plates, will be

issued every three months. Figures of both surfaces will be given, and of both sexes wherever possible. The pages will not be numbered, but, with the plates, will be so arranged that finally the species of each genus can be brought together. This plan admits any enlargement of the volume which, whenever concluded, will be complete in itself.

By North America is to be understood all that part of the Continent north of Mexico, according to the division adopted by the Smithsonian Institution.

The letter press will, in most cases, necessarily be confined to technical descriptions, but whenever it is possible, such a history of the species will be given as I have been able to gather from my own observations or from others.

It is a matter of regret that, in so few instances, I shall be able to say anything of the larvæ. Even among our old and common species, the larvæ are but little more known than in the days of Abbot, seventy years ago. His observations seem to have been more thorough or more fortunate than those of any of his successors.

With the second or third number a Synopsis of Species will be commenced, and will be concluded within the volume.

PHILADELPHIA, March, 1868.

W. H. EDWARDS.

PAPILIO.

I.



Drawn by Mary Peart

T. Sinclair's lith. Phila

AJAX, VAR. WALSHII, 1, 2, 3, 5 ♀.
 4. larvae 5. chrysalis. 6. var. Abbotii ♂
 Food Plant, *Asimina triloba*.

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PAPILIO I.

PAPILIO AJAX.

Papilio Ajax, Linnæus, Syst. Nat. II, p. 750. Fab. Syst. Ent. p. 455.

Var. *Walshii*.

Ajax, Bois. & Lec. text, (not plate) p. 4; ibid. Spec. Gen. I, p. 258.

Marcellus, Cramer, pl. 98.

Sub-var. *Abbotii*.

Ajax, Abbot, Ins. Ga. pl. 4.

Ajax, Felder, Spec. Lepid. p. 15.

Var. *Telamonides*, Felder, Zool. Novara Exped.; ibid. Spec. Lepid. p. 15.

Ajax, Godart, Enc. Meth. IX, p. 53. Bois. & Lec. pl. 1, (not text).

Var. *Marcellus*, Boisduval. Bois. & Lec. p. 8, pl. 2; ibid. Spec. Gen. I, p. 257. Felder, Spec. Lepid. p. 15.

Ajax, Esper, Eur. Schmett. I, pl. 51. Hübner, Exot. Samml. Schmett.

AJAX.—VAR. WALSHII.

Primaries broad, but little produced apically; costa moderately arched; hind margin in male concave, in female convex; tail short, narrow; thorax covered with long hairs; hairs of palpi long and bristling.

MALE.—Expands from 2.6 to 2.8 inches.

Upper side pale black, marked and banded with greenish yellow; the hind margin broadly edged with black which is much advanced on costa of primaries and encloses a yellow band, divided by the nervures into spots which posteriorly are lunate; on the costa a yellow spot and a stripe that reaches from costal edge to inferior corner of cell; preceding this is a broad common yellow band that terminates on middle of secondaries and encloses on costal margin of primaries a variable black stripe, bar or spot, often nearly obsolete; next, a black band bifid on costa and enclosing there a yellow stripe; and a second yellow band, narrow, terminating at a point below the first; bases of both wings and abdominal margin of secondaries black; on primaries a yellow streak quite at base.

Secondaries regularly dentated, the excavations fringed with pale yellow; tails of moderate length, straight, varying in width in individuals, often very narrow, black tipped only with pale yellow and slightly edged with same color at base on either side; along hind margin four whitish lunules; near angle two lunular clusters of blue scales on the black ground, above the hindmost of which is a

PAPILIO 1.

deep yellow patch at the excavation of abdominal margin; over this is a black sub-ovate spot enclosing a blue streak or lunule; next above a sinuous crimson bar, the upper edge often bordered by white; the disk opposite this bar irrorated with fine yellow scales.

Under side much the same in markings, the dark portions decidedly brown, the light bands greenish yellow more or less tinted with buff; within the marginal border anterior to the macular band and to the spots on secondaries is a reddish-grey stripe separated from each of the lunules by a black bar extending across the interspace; the limb irrorated with yellow; the crimson bar as above but always broadly edged with white, and nearly or quite connected with a sinuous crimson stripe which runs through the middle of the black band to the costal edge, and is also edged anteriorly by white.

Body black, the thorax above covered with long yellow-grey hairs, beneath black quite to the head; a narrow yellow stripe passes along the side of thorax and a yellow line starting at the insertion of secondaries passes along the side of abdomen to last segment; palpi furnished with long bristling black hairs; antennæ reddish, club same above, reddish-brown beneath.

FEMALE.—Same size and similar in color and markings.

Sub-variety *ABBOTII*.—Resembles the variety just described except that on upper side of secondaries is a crimson streak, more or less distinct, nearly parallel to abdominal margin.

In some respects *Walshii* is further from *Telamonides* than the latter is from *Marcellus*. Besides the differences in the tail, the blackness of the body and the bristling front of the palpi are conspicuous. More than half the individuals met with are of the narrow tailed variety represented on the plate.

The egg is pale green, globular, smooth, .016 in diameter. Duration of this state 7 to 8 days. The larva, on emerging from the egg, is black, covered with minute papillæ from each of which proceed fine hairs. After first moult, which takes place at three days, it is ash colored, still covered with the papillæ. These are lost at the second moult, after four days, when the larva assumes the general form and smooth skin which it shows at maturity, the color being yellow-white, with transverse grey stripes. After third moult, which takes place in six to eight days, the color is smoky-brown, each segment crossed by four lines of which the anterior is yellow and the rest dull white; the second, third and fourth segments without yellow, and the white lines nearly crowded out by the expanding of the brown; at the junction of fourth and fifth segments is a velvety black band preceded by a white on the fourth and followed by a yellow one on the fifth. At the fourth moult, from seven to ten days, the color becomes darker, quite black on the

PAPILIO I.

four anterior segments and dorsally throughout, crossed by a pale yellow and four grey stripes. This phase continues to maturity, about four days. Among 66 larvæ of *Walshii* there was remarkable uniformity, and especially none were green, nor was there a trace of the blue band on fourth segment which replaces the white one in many larvæ of *Telamonides* and *Marcellus*. Duration of larval state from 22 to 29 days.

Chrysalis .8 to .9 in length, greatest diameter .3; cylindrical, tapering posteriorly from middle of abdomen; head triangular, terminated by two short, lateral sub-conic points; another on thorax, triangular, the upper edge slightly curved, beak-like; from this two small ridges pass along the wing cases and down the abdomen to extremity, and between them two others starting from upper segments of the abdomen, on the outer sides of which last, in those chrysalids which are brown, is a fine dentated light colored line; surface reticulated and on the abdomen marked more or less distinctly by transverse abbreviated dark bars; color either dead leaf brown or bright green. Duration of chrysalis state 14 days, but with frequent cases of irregularity. Some of the chrysalids retain the imago till the following spring.

PAPILIO.

III.



Drawn by Miss Leach

AJAX, VAR. TELAMONIDES. 1. 2. ♂; 3. ♀

L. Bourne del. 1861

4 Young larva 5 Mature larva.
6, 7. Chrysalids. 8. Egg, magnified.
Food-plant. *Phytolacca*.

PAPILIO II.

AJAX.—VAR. TELAMONIDES, Felder.

Primaries more produced than in var. *Walshii*; costa more arched; hind margin in male more excavated, in female convex; tail longer and broader; thorax covered with long hairs; hairs of palpi of medium length.

MALE.—Expands from 2.8 to 3.2 inches.

Similar in color and disposition of bands and markings to *Walshii*; the tail not merely tipped with yellow, but bordered on either side from half to two-thirds the distance from tip to base, the extreme edges, except at tip, being black; the crimson bar narrower, often bilobed, and occasionally broken into two spots; the four marginal lunules usually distinct.

Body above as in *Walshii*, but beneath much less black, the collar being yellow and the yellow lateral stripes broad and bright; palpi black in front, yellow at sides and at base, the hairs shorter than in *Walshii*; antennæ reddish, club same, reddish-brown beneath.

FEMALE.—Same size and resembles the male.

Telamonides is midway between the other two varieties in size. It has the fore wings of *Walshii*, especially in the female, but the hind wings are produced after the manner of *Marcellus*, and it has the tail of *Marcellus*, as well as the yellow throat and sides of thorax and abdomen. Like *Walshii* it has a crimson bar, but this is often broken into two spots. The hairs of the palpi are not wholly black and are but of medium length.

Egg similar to that of *Walshii*. Duration of this state 4 to 5 days.

Larva similar up to the second moult, after which there is a wide divergence, some retaining a resemblance to *Walshii*, others being entirely black unrelieved by any light color whatever; in others the general color is grey, with white, black and yellow bands on fourth and fifth segments, and the segments after fifth crossed by one yellow and two dull white stripes. At other times the color is blue-green, each segment crossed by grey, yellow and clear white, the white band replaced by turquoise blue. Or the color is pale green throughout, except one yellow stripe on each segment, the bands being blue, black and yellow. There is also a variety on which the black stripes are broken into points giving the larva a speckled appearance. Duration of larval state 15 to 18 days.

Chrysalis similar to that of *Walshii*, and either brown or green. Duration of this state 11 to 14 days.

PAPILIO.
III.



Drawn by Mary Peart

AJAX, VAR. MARCELLUS, 1, 2 ♂, 3 ♀.
4. Young larva; 5. mature larvæ in var.; 6. Chrysalides in var.

PAPILIO III.

AJAX.—VAR. MARCELLUS, Boisduval.

Primaries in both sexes equally and largely produced, hind margins much excavated; costa less arched than in *Telamonides*; secondaries more produced; tail longer and broader; thorax covered with short hairs; hairs of palpi very short.

MALE.—Expands from 3.2 to 3.5 inches.

Color deep black, the borders and black bands broader than in either of the other varieties; the light portions pale blue-green in fresh specimens; the stripe between the forks of mesial black band reduced to a mere streak; the two common green bands terminate on secondaries higher up the wing by nearly the width of one interspace; the tail very long and broad, bordered and edged as in *Telamonides*; the crimson band reduced to a single lunate spot of variable size, and occasionally wanting, with very rarely a second spot, always minute; the two middle lunules on the margin distinct, the other two more or less obsolete; a greenish band at base of both wings, on secondaries following the edge of the abdominal fold. On the under side the light portions tinted with buff, especially on costa and along the principal nervures and either edge of the black common band; two crimson anal spots; otherwise as in *Telamonides*.

Body above black, the thorax covered with short grey hairs; beneath wholly bright yellow, except a narrow black stripe extending from the head to end of abdomen, passing beneath the insertion of the wings and a stripe along lower part of thorax and abdomen; a short black line inside the yellow space just before the last segment of the abdomen; palpi furnished with very short hairs, black in front yellow at base; antennæ reddish; club same, reddish-brown beneath.

FEMALE.—Expands 3.5 inches.

The green bands of deeper color and narrower, leaving the surface very black. In many cases the green shade is replaced by a soiled or buff-white with no trace of green. The second crimson spot appears more often than in the male.

Marcellus differs from the other varieties by its increased size and blackness of wings and by their shape in both sexes, in the absence more or less complete of one or two of the yellow marginal lunules, in the substitution of a single large lunate crimson spot, occasionally accompanied by a crimson point, in place of bar of *Walshii*, or the double and usually equal spots of *Telamonides*. It also differs from the latter in the proportionate length and breadth of tail; is still more yellow on throat and thorax; and the short hairs of the palpi are yellow and black.

PAPILIO III.

Egg similar to that of *Walshii*. Duration of this state 4 to 5 days.

The larvæ of *Marcellus* combine the variations of *Walshii* and *Telamonides*, about one half resembling those of the former, and most of the remainder being either green or blue-green, as before described, with blue, black and yellow bands on fourth and fifth segments. Duration of the larval state twelve to nineteen days.

Chrysalis similar to that of *Walshii*, but varying much in size, the largest being .1 broader and .2 longer; thoracic process more prominent and hooked, and the reticulations and abbreviated bands more conspicuous. Color either brown or green. Duration of chrysalis state 11 to 14 days.

I subjoin the diagnoses of these forms given by Mr. Felder in his *Species Lepidopterorum*, Vienna, 1864, pp. 15 and 59.

Section 23. Sub-section E.—MARCELLUS.

"Wings much broader than in preceding sub-sections, (i. e. *Sinon*, &c.) hind wings deeply dentated, much more produced, costa convex, the lower disco-cellular nervule of fore wings less sinuous, the cell of hind wing broader, the lower disco-cellular nervule much longer."

Sub-section F.—TELAMONIDES and AJAX (*Abbotii* and *Walshii*).

"Fore wings less produced apically, the cell shorter; costa of hind wings longer but anal region much less produced than in *Marcellus*; the superior and inferior disco-cellular nervules of fore wings a little concave outward; cell of hind wings much shorter, the inferior disco-cellular nervule shorter; tail narrower, shorter; club slender; front very hairy."

Here therefore are three well defined forms, differing in many specific characters and long recognised as distinct species. For eight years past I have had favorable opportunities for studying their habits, and have been intent on solving what very early struck me as a mystery. I am pleased at last at having met with sufficient success to warrant my giving the results thus far obtained in this volume.

Mr. Wallace, (Natural Selections, pages 145–159,) has admirably described and illustrated the phenomena of dimorphism or polymorphism. This is occasioned by common parents producing two or more forms of offspring of distinct types, without intermixture or hybridism, and among the lepidoptera, as stated by this author, has usually been observed in the female sex only. We have many examples in our fauna, partly cases of albinism, as in *Colias*, of flavism, in *Anthocaris*, or of melanism, as in *Lycæna*, and notably in case of *Papilio Turnus*, one of our largest, most widely distributed and best known butterflies. The male of this is always yellow, but the females in the Middle and Southern States are dimorphic, one form being yellow like the male, the other black. (There are however occasional cases of true hybridism between dimorphic forms, and I have several examples of hybrid *Turnus*, one of which is perfect.) We have also a case of dimorphism in *Grapta Interrogationis*, that embraces both sexes. There is another phenomenon

PAPILIO III.

called "seasonal" dimorphism by Mr. Wallace, where great differences exist between the autumnal and vernal broods of the same insect, occasionally known to occur.

These phenomena meet in the species *Ajax*, there being a complicated seasonal polymorphism and also true polymorphism in both sexes. Moreover there is a considerable degree of variation in each of the three principal forms (though not to an extent to constitute intergrades) not merely in the imago but strikingly in the larva and somewhat in the chrysalis. There is also a tendency to still further departure from the average specific type, as seen in the sub-varieties of *Walshii*.

It is not certain which of these forms was first described as *Ajax* and should be entitled to give name to the species. The indefinite language of Linnæus and Fabricius may apply to either. The figure of Esper, under the name of *Ajax*, represents *Marcellus*; Cramer's *Marcellus* is the one which I designate as *Walshii*. Abbot's figures represent a variety of this last, the difference consisting in the presence of a carmine stripe on the upper surface of secondaries. This form is not uncommon, though I believe the stripe is always imperfect and in no case so prominent as appears on Abbot's plate. About one individual in ten of either sex of *Walshii* exhibits traces of the stripe to a greater or less degree.

Boisduval and Leconte regarded this *Abbotii* as entitled to be considered the true *Ajax*, because besides giving a figure of the imago, Abbot also gives the larva and chrysalis, and they proposed to follow him. In the text they do so very nearly, but their plate represents *Telamonides*. Felder also accepts Abbot's figure as that of the typical *Ajax*.

As regards the claims of the three principal varieties they are equal; neither can be called a variety of the other, but they are varieties of one species. To avoid confusion it seemed to me well to apply the name *Ajax* to them collectively and to designate two of them by the names which have become familiar. The other I name in recollection of the late Benjamin D. Walsh, whose untimely loss proves well nigh irreparable to American Entomology. A second sub-variety of *Walshii*, characterized by very narrow tails and usually by diminutive size was pronounced by Mr. Felder, to whom it had been submitted, as distinct and constituting a fourth species, (see plate herewith).

I am not certain whether *Walshii* is as wide spread as *Telamonides* or not. Mr. Walsh informed me that he had never met with it in Illinois, where the other was common. But I have received it from Eastern Virginia and Dr. A. W. Chapman has sent it to me from Florida. Dr. G. M. Levette, has taken it abundantly in the month of April, near Indianapolis. Abbot's figures purport also to have been taken from a Georgian insect. It seems probable therefore that it is wide spread but has been over-looked or confounded with *Telamonides*.

PAPILIO III.

Walshii appears in the Kanawha Valley (West Va.) from the fifteenth to twentieth of March, by which time the peach trees are usually in bloom. On these the females may certainly be found, and a little later, on the apple and in great numbers on the wild plum. The males appear a few days earlier and are to be seen by the water side or upon the road, but rarely upon flowers. The larvæ feed on the Pawpaw (*Asimina triloba*, Gray), and as this is one of the latest of our trees to put forth its leaves, the butterflies are out at least from two to three weeks before the young shoots of the food plant are visible. But no sooner do these appear than the females hasten to deposit their eggs. *Telamonides* begins to fly some weeks after *Walshii*, and both forms in this valley are for a time common. About the first of June, *Walshii* disappears, and before the end of the month *Telamonides* also. I have never seen either later than June save in one instance. In this, Mr. Theo. L. Mead captured a newly emerged *Telamonides*, at Coalburgh, 12th Sept., 1869. Mr. Mead is an accurate observer, and during several weeks spent with me, paid particular attention to this species. Every season I have brought me great numbers of butterflies taken in the vicinity, and as no other case of the late appearance of these two forms has come to my knowledge, it may be assumed that this occurrence of *Telamonides* was exceptional.

About 1st of June, *Marcellus* begins to appear and shortly is out in great numbers, continuing to be abundant till last of October. I have seen *Marcellus* in but one instance before last of May, and that was 11th April, 1867, when I myself captured a female on the wing, as much out of its season as the *Telamonides* in September.

I became satisfied in my own mind some years ago that one of these forms was the summer or fall brood and the others the spring broods of the same insect, having every year raised many of the larvæ, either found on the leaves of the food plant, or bred from eggs so found, and the results thus obtained agreeing with outside observations. But however probable it might appear, it was not possible to establish the certainty till the missing link could be supplied and one form bred from eggs actually laid by another, especially when the appearance of the *Marcellus* taken in April and the *Telamonides* emerged from chrysalis in April, 1868, hereafter referred to, furnished strong reasons for doubt.*

* NOTE.—It is true that Dr. Morris, in 1862, had stated in his Synopsis, page 9, that Dr. Gray considered *Ajax* and *Marcellus* to be varieties of the same insect, and added, "This is now the opinion of all the collectors in this country. One of them declares that *Ajax* is the spring and *Marcellus* the fall brood of the same species." But no reason for this opinion or proof of the assertion was given, and Dr. Morris allowed me to deny the identity of the two species in his appendix, p. 351, without comment. At best, no one seems to have more than reached an opinion founded in some cases probably on facts identical with those afterwards observed by me.

PAPILIO III.

To obtain this missing link seemed impossible and year after year I had failed. Twice I had seen a female *Telamonides* deposit an egg and succeeding in hatching the larva therefrom. But in one instance it died before maturity and in the other, the larva from an egg deposited 11th May, 1867, gave *Telamonides* in April, 1868. I had also succeeded in raising larvæ from eggs seen to be deposited by *Marcellus*, but merely ascertained that the early summer brood of this form produced its like a few weeks later, without gaining any light as to the last brood of the season. The females would not lay their eggs in captivity, either in empty boxes or on cut branches of the food plant.

In 1870, I determined to try the effect of confining the females with the growing food plant, and 16th May, enclosed in a keg from which the heads had been removed and the upper end covered with gauze, a *Telamonides*. During the day it laid several eggs on the leaves. I was now obliged to leave home, and was absent two weeks. On returning I found six larvæ only in the keg, of equal size and about half grown. Others had been hatched but had either escaped or had been destroyed. By 5th June, these larvæ had stopped feeding, although but three weeks had elapsed since the female was enclosed. On 7th, they had fixed and by 8th had become chrysalids. Between 20th and 24th they had yielded imagos, 2 ♂, 4 ♀, all *Marcellus*. Time from laying egg to imago 35 days.

On 1st June, I enclosed three *Telamonides*, and, on 2d, had obtained from them 37 eggs. From these, on 3d July, 2 ♀ *Marcellus* emerged and others followed till 9th, when I had 12 ♂, 10 ♀, all *Marcellus*. Time from laying of egg to imago 33 days. One chrysalis from this brood went over the season, and 1st April, 1871, yielded ♂ *Telamonides*.

On 7th June, I enclosed a *Marcellus* and from it, on 23d, had five mature larvæ. On 4th July, 1 ♀ *Marcellus* emerged, on 9th 3 ♀. Time from laying of egg to imago 27 days. One chrysalis went over the season and was alive 1st April 1871, but died before yielding imago.

On 1st July, I enclosed a *Marcellus*, which in point of time would be of the second brood in succession from *Telamonides*. By 18th, there were eighteen larvæ living from which resulted fourteen chrysalids. On 31st, the imagos began to appear and by 3d August, there were 4 ♂, 3 ♀, all *Marcellus*. Time 30 days. Seven of this lot of chrysalids passed their period and one of them gave ♀ *Marcellus*, on 28th August, six weeks afterwards. The other six went over the season and were living in the following February, but unfortunately were destroyed by fire about the end of that month.

Late in August, from eggs of *Marcellus* obtained in same way, I had two larvæ which matured 12th Sept. One of these soon after yielded *Marcellus*, the other went over the season but was lost with those before mentioned.

PAPILIO III.

On 15th Oct., I had several larvæ feeding. Of these but one went to chrysalis before frost killed the leaves of the food plant and caused the loss of the remainder. This one yielded *Telamonides* ♀, 15th April, 1871.

These observations therefore shewed that from *Telamonides* came *Marcellus* the same season and *Telamonides* in the following spring, that from *Marcellus* came successive broods of *Marcellus* the same season, and from the last brood *Telamonides* in the spring.

It also appeared that while there was a general limit to the duration of the chrysalis state, namely about 12 days, there were frequent exceptions, the imagos then emerging at irregular periods and some of nearly every brood living in chrysalis till the following spring.

The rapidity of growth from the egg was surprising, as compared with our other Papilios. In 1869, by obtaining very young larvæ within a day or two after I had had butterflies emerge from chrysalis, I became satisfied that, besides the first brood from *Walshii* or *Telamonides*, there are three successive broods of *Marcellus* and the larvæ of the fourth give chrysalids that go over the winter, thus making five broods per year.

These observations failed to determine the connection between *Walshii* and the other two forms, though I had good reasons for feeling confident as to what that connection might be. For example, from twenty-seven chrysalids obtained from larvæ found on the food plant in Sept. 1868, and which it is now plain must have come from the last brood of *Marcellus*, emerged twenty-seven imagos between the 2d and 21st April, 1868. Of these, twenty-six were *Telamonides*, and one was *Walshii*. Also from chrysalids of Sept. 1869, emerged two var. *Abbotii* in March, 1870.

Out of fifty-seven chrysalids from larvæ found on food plant in last of June and 1st of July, 1868, which were probably from first brood of *Marcellus*, forty-five produced *Marcellus* within the usual period; but five went over the winter, and between 24th March and 8th April, 1869, yielded five *Telamonides*. Another larva fed in August, 1868 (2d or 3d brood of *Marcellus*) produced *Telamonides* 23d March, 1869.

In the spring of the present year, (1871) *Walshii* was unusually abundant and it seemed to me, at the expense of *Telamonides*, which was comparatively scarce. On the 10th April, I confined three *Walshii* with the food plant, and by 12th, had obtained one-hundred and twenty-five eggs. On the 16th, I confined two others of same type separately and obtained many more eggs. The larvæ from the last laying overtook in growth those of the first so that but one day intervened between the first chrysalis of each. Between 17th and 23d May, all the survivors had changed, numbering seventy. From these emerged, between 1st and 6th June, fifty-eight butterflies, of which 22 ♂, 34 ♀, were *Marcellus*, one ♂, *Walshii* and one

PAPILIO III.

♂, *Telamonides*. On 23d June, full three weeks after its period came another ♀ *Marcellus* and a second followed on the 12th July. Of the other chrysalids seven are living at this date (15th October). In these cases the eggs of each lot were unusually long in hatching, 8 days, and the time from laying of egg to imago of the first was 51 days and of the second 44.

On 23d May, I enclosed another *Walshii* with the usual result. The eggs began to hatch on 28th, five days. From these, on 13th June, I had thirty-two chrysalids. The first imago appeared 24th June. Time from laying of eggs thirty-one days. By 30th, 10 ♂, 7 ♀, *Marcellus* had emerged and 14 chrysalids are living at this date (15th October).

On 27th May, I enclosed a *Telamonides* that had but a slight trace of white at sides of the tail near the tip and in this respect approached *Walshii* much more nearly than I had before observed in that variety, though otherwise it was distinctly *Telamonides*. From this I obtained many eggs which hatched on 31st and gave nineteen larvæ. These were peculiar in that they were all remarkably black, and several entirely so, without even the usual white line on fourth segment. The butterflies began to emerge on the 28th, and there resulted seven *Marcellus*. Time from laying of egg 32 days. At this date 15th October ten chrysalids are living.

From another *Telamonides* enclosed 28th May, resulted 2 ♂, 2 ♀ *Marcellus* on 3d and 4th July, and six chrysalids are still living (15th October.)

On 1st and 4th June, I enclosed several *Marcellus*. These laid scores of eggs and in due time I had 123 larvæ, and from them on 2d July, seventy-six chrysalids. On the 5th, the imagos began to appear and by 13th, 21 ♂, 15 ♀, had emerged, all *Marcellus*. At this date, (15th October) 40 chrysalids have long passed their period. Time 34 days.

Finally, on 29th July, I enclosed a *Marcellus*, and obtained therefrom forty-two chrysalids. Of these, thirteen produced *Marcellus* 4 ♂, 9 ♀, and twenty-nine go over the season.

It will be noticed that a large percentage of the chrysalids of nearly every brood pass the winter, the proportion seeming to increase as the broods succeed each other. Of the first brood of *Walshii*, of 67 chrysalids, 7 passed over; of the second of 39 chrysalids, 14; of the first of *Telamonides*, of 17 chrysalids 10; of the second of *Telamonides* of 10 chrysalids, 6; of the first brood of *Marcellus*, of 76 chrysalids, 40; of the second brood of *Marcellus*, of 42 chrysalids, 29.

The summing up therefore of this whole series of observations is this; *Walshii* produces *Walshii*, *Telamonides* and *Marcellus*, the same season; *Telamonides* produces *Marcellus* the same season and its own type in the Spring; *Marcellus* pro-

PAPILIO III.

duces successive broods of *Marcellus* the same season, and occasionally *Telamonides*, (individual taken by Mr. Mead in September, 1870) and the last brood produces *Walshii* and *Telamonides* in the Spring; and whenever any of the chrysalids of either brood of *Marcellus* pass the winter they produce the other two varieties, and probably sometimes their own type (individual taken April, 1867.) The chrysalids of *Walshii* that pass the winter of 1871—2 will probably produce *Walshii* or *Telamonides*.

Thus there are *Marcellus* produced by three different types of parent, and *Telamonides* by three and probably *Walshii* by the same number. I have carefully compared individuals of each variety so sprung from several parents and can discover no tangible points of difference. Except in what I should call non-essential variations and which each variety is subject to, such as width of the bands, &c., each is true to its own type no matter what its parentage.

The duration of the several states of egg, larva and chrysalis also differs greatly, especially between *Walshii* and the other two varieties.

	EGG.	LARVA.	CHRYSLIS.	TOTAL.
<i>Walshii</i> ,	7 to 8 days.	22 to 29 days.	14 days.	43 to 52 days.
<i>Telamonides</i>	4 to 5 days.	15 to 18 days.	11 to 14 days.	30 to 36 days.
<i>Marcellus</i> ,	4 to 5 days.	12 to 19 days.	11 to 14 days.	27 to 38 days.

The female of *Ajax* may frequently be seen coursing through the pawpaw trees which hereabouts cover the lower hill-sides, or hovering about the young plants that spring up in the cultivated fields, searching for leaves on which to deposit her eggs. After touching or running over and rejecting several, she finds one suitable to her purpose. Thereupon, balancing by the rapid fluttering of her wings, she stands for an instant with legs stretched at full length, perpendicular to the body, and curving down the abdomen till it touches the surface, deposits a single egg; then flies away, presently to alight on a second leaf with like intent. Sometimes the egg is upon the stem and occasionally on the under side of the leaf, but almost always it is on the upper side, and but one egg will usually be found on the same leaf. The process of laying continues for several successive days. At certain seasons it is almost impossible to find a young plant that is free from these eggs and it is easy to collect scores of them.

On dissecting the abdomen of a newly emerged female the eggs are found to be fully formed though not full-sized. I conclude that they mature with great rapidity because fertile eggs are laid by apparently fresh and uninjured females. With the *Vanessans* and *Argynnides*, (probably with the *Nymphalidæ* generally,) this is far from being the case, the eggs maturing in the ovaries for a long period before they are ready for impregnation.

PAPILIO III.

Many eggs are destroyed by insects and spiders. There is a minute scarlet spider scarcely larger than the egg itself, that mounts upon it and from a puncture extracts the contents. I frequently met the shells so despoiled before I discovered the cause and have since observed the marauder in its operations. I have also lost in a single night, owing as I supposed to crickets, numbers of eggs laid in confinement.

The larvæ, in every stage of growth, are to be found resting on the surfaces of the leaves and one would suppose they must be nearly exterminated by birds. But like all Papilio larvæ, they emit from the head, at the same time that they project a Y shaped tentacle, a peculiarly acrid and sickening odor which must effectually protect them. I have however seen spiders feeding upon them, attacking even the head, and they have other enemies among the insects. They are very little troubled by ichneumon-flies in this valley, and I have rarely lost a chrysalis from that cause. Consequently no Papilio is so abundant here throughout the season. I find on breeding them that a considerable percentage of the eggs do not hatch, and that more or less of the larvæ die at every moult, as well as in the effort to change to chrysalids. Multitudes of chrysalids must be destroyed in the winter by birds and mice as they are but imperfectly concealed under stones and roots or even among the stems of the grasses. So that of the tens of thousands of eggs that are annually deposited but a very small proportion produce butterflies.

I am now clearly of the opinion that the number of each sex in any species of butterfly is about equal. On counting the *Ajax* that have emerged from chrysalis the last two seasons, I find 78 ♂, 83 ♀, and with the *Interrogationis*, *Comma*, and other species I find about the same proportion. The scarcity of the females noticed by all collectors is owing to their frequenting different localities from the males.

With regard to obtaining the eggs of any species of butterfly, after two seasons experience, I find not the least difficulty, provided the food plant be known. If, on being confined with this, they do not immediately proceed to deposit their eggs, it is because these are not matured. I have repeatedly failed with the large *Argynnis* until the month of September, and then have obtained hundreds of eggs. The larvæ of *Argynnis* are the only ones however I have been unable to rear, and so far I have failed in every instance, though with *Euptoieta Columbina*, closely allied on one side, and the *Vanessans* on the other, I have had no difficulty whatever.

PARNASSIUS.

I.



Drawn by Mary Peart

Bowen & Co. Lith. Phila.

CLARIUS. 1 2 ♂ 3 4 ♀
CLODIUS. 5 6 ♂

PARNASSIUS I.

PARNASSIUS CLARIUS. 1—4.

Parnassius Clarius, Eversmann, Bull. de Mosc. XVI, p. 9. Bois. Ann. Ent. Soc. Fr. 1852.
Clodius, Bois. Lep. de la Cal. 1869.

MALE. Expands 2.2 to 2.4 inches.

Upper side sordid white; the outer half of primaries semi-transparent, crossed to first median nervule by a submarginal row of white lunules; a second abbreviated row of four similar lunules from the costa, separated from the white ground by a narrow semi-transparent space; base densely powdered with black atoms which extend for some distance along costal margin and cover nearly half the cell; on the arc a pale black bar, another across cell; sometimes a black patch in submedian interspace. Secondaries have the base and upper part of abdominal margin densely powdered with black, which rarely reaches the extremity of the cell; on costal margin a small, rather angular than round, spot, either reddish yellow or bright red, within black ring, and occasionally with a white pupil; in upper discal interspace a second similar spot, smaller, but often represented by a black point only; in some individuals a pale black narrow bar near anal angle.

Under side vitreous; the black markings of upper side faintly reproduced; both red spots conspicuous and usually with white pupils; at base of secondaries occasionally traces of three or four red spots, but usually these are wholly wanting; where on upper side there is an anal bar, beneath is a pale red bar with blackish edges.

Body above covered with grey hairs; thorax brownish yellow above and beneath as is also the abdomen beneath; palpi a deeper shade of yellow; antennæ black.

FEMALE. Expands 2.4 to 2.6 inches.

Nearly the whole of primaries semi-transparent, crossed by a submarginal and discal row of white lunules or spots; a third row borders the extremity of the cell; the cellular bars larger than in male and the black atoms at base much extended, filling a large part of the cell.

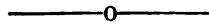
Secondaries sordid white bordered by a row of large concolored lunules edged anteriorly by narrow semi-transparent crenations; the red spots much larger than in male, the one on disc accompanied by a small black spot on its inner side; anal patch large, red, edged by black; on the under side this patch has a white centre and the spots white pupils; the basal red spots distinct; abdomen furnished with a large, white, corneous pouch.

PARNASSIUS I.

LARVA unknown.

Found in the Sierra Nevada, Yo Semite Valley and other localities in California.

Respecting this species, Mr. Henry Edwards writes, "I have seen *Clarius* on the wing and have taken both sexes. They were flying in a shady canon of the Sierras near Donner Lake, alighting frequently, taking short flights and having very much the appearance of dirty and worn *Pieridæ*. Their flight is a short, jerking motion not unlike many Hesperians and they are easily captured. *Clarius* is a much more common insect than *Clodius* and seems to have a far wider range. I have also seen it in various parts of the Sierra Nevada from near Mt. Shasta down to Inyo Co., while *Clodius* I only know from the specimens collected by Mr. Behrens at Bodega. *Clarius* appears to be strictly a mountain insect, being found at as high an elevation as 7500 feet, while *Clodius* occurs at far lower levels, and even at the sea coast."



PARNASSIUS CLODIUS. 5—6.

Parnassius Clodius, Menetries, Enum. Corp. Anim. Mus. St. Petersb. I. p. 73.

MALE. Expands 3 to 3.5 inches.

Upper side of both wings cream white, except the outer extremity of primaries which is semi-transparent and crossed, as in *Clarius*, by two rows of white lunules; in the cell two bars, as in that species, but the one on arc broader and at its lower extremity sharper, the color of both being a dense black, therein differing noticeably from *Clarius*; a black patch in sub-median interspace; costa and base moderately powdered with black scales which extend over nearly one-half the cell.

Secondaries densely powdered with black from base quite to the extremity of the cell; two nearly round, bright red spots, of equal size, situated as in *Clarius*, each in a broad black ring and usually with a small white pupil; at anal angle a conspicuous black arc, sometimes wanting.

Under side vitreous, the black markings as above but paler; the ocelli distinct, their pupils enlarged; at anal angle a red arc edged by black; at base three or four red patches, usually distinct with well defined black edges, but occasionally faint without black; these red spots when distinct are visible on upper side.

Body above covered with grey hairs; abdomen at extremity yellow, beneath yellow brown; palpi yellow brown; antennæ black.

FEMALE. Unknown.

From several males taken at Bodega, Marin Co., California, by Mr. James Behrens.

Having seen but a limited number of Parnassians from California, I had supposed the insect represented by figs. 5 and 6, on the plate, to be a marked variety

PARNASSIUS I.

of *Clarius*. But the protest of Mr. Behrens, who had seen a proof of the plate, and the result of a re-examination by Mr. Henry Edwards, to whom I had referred the question, have made me think it probable that there are two species, and that figs. 5 and 6 represent the true *Clodius* of Menetries. His description purports to have been taken from a single male "brought from California by Wosnesensky" without further notice of its habitat. Menetries states that it is distinguished from *Clarius*, Eversmann, by its great size and dead white color, and he describes in nearly all respects an individual closely resembling the one figured on our plate.

Boisduval, in his paper of 1852, gives a description of *Clarius* which seems to have been drawn from individuals of that species, and he states that it is found in the mountains of California.

But in his *Lepidoptera of California*, 1869, he states that he was in error in considering the species he had before described to be the *Clarius* of Eversmann and substitutes therefor *Clodius* Menetries, omitting the former from his list of species.

Mr. Edwards, who has devoted many seasons to collecting the Californian butterflies and who is largely acquainted with their habits and localities, writes, "I am fully convinced from an examination of all the specimens within my reach, in my collection and in those of Mr. Behrens and Dr. Behr, that we have two species of *Parnassius* nearly allied and that these have been described by Eversmann and Menetries. The great differences appear to me to be that *Clodius* is larger than *Clarius*, of a clearer white, less transparent, with the red ocelli of a brighter, clearer color, and *always* with red spots at the base of secondaries beneath. The two black stripes on primaries are sharper, wider, and of a more intense black. In a long series of these insects perhaps other characters would present themselves, but in what I have seen, the distinctions appear to be well preserved."

I have tabulated the differences between the males of the two species. thus;

CLARIUS.	CLODIUS.
Expanse of wing 2.4 inches.	Expanse 3.5 inches
Color sordid-white.	Color cream-white.
Discal bars pale.	Dense black.
Sometimes black spot on inner margin.	Always black spot on inner margin.
The two red spots, rather angular, of unequal size, one often a mere point.	The two spots of equal size, rounded.
Color of spots varying from pale yellow red to bright red.	Color bright-red.
Sometimes a narrow, pale bar at anal angle; often wanting.	Usually a conspicuous, deep colored bar at anal angle.
Sometimes a pale red bar at anal angle below	Always a large red arc at anal angle below.
Usually no red spots at base of secondaries.	Always red spots and usually conspicuous.

PARNASSIUS I.

Clarius, is also a mountain species. *Clodius*, so far, has only been found on low ground near the sea coast.

Until within a few years this genus was supposed to be restricted to the old world and to contain but a small number of species, scarcely more than have already been found in North America. They mostly inhabit high mountain regions, the Alps, Caucasus, Himalaya, the mountains of Siberia and China, and recent expeditions have revealed the existence of many new species.

Parnassius is considered to form the connecting link between the Papilios and the Pieridæ, partaking of certain characteristics of both, yet presenting others quite anomalous. The larvæ are furnished with the Y shaped tentacle on second segment which is found in all the Papilionidæ and is peculiar to them, but in other respects resemble the larvæ of the Hesperidæ or of certain moths. So also does the chrysalis, which, instead of being naked and suspended by a single thread around the middle of the body as in the Papilios and the Pieridæ, is enveloped between leaves in a slight silken web supported by several threads. It is moreover cylindro-conical in shape and is covered by a bluish powder as in the moths of the genus *Catocala*. The butterfly, in general appearance, resembles the Pieridæ as it does also in the palpi and antennæ. Unlike any other lepidopterous insect the extremity of the abdomen of the female is provided with a corneous appendage, taking the form of a large, open pouch as in *Clarius* or of a small keeled pouch as in *Nomion* and *Sayii*. The larvæ of the European species feed upon species of saxifrage and sedum and probably those of the American species will be found upon similar plants.

PARNASSIUS.

II.



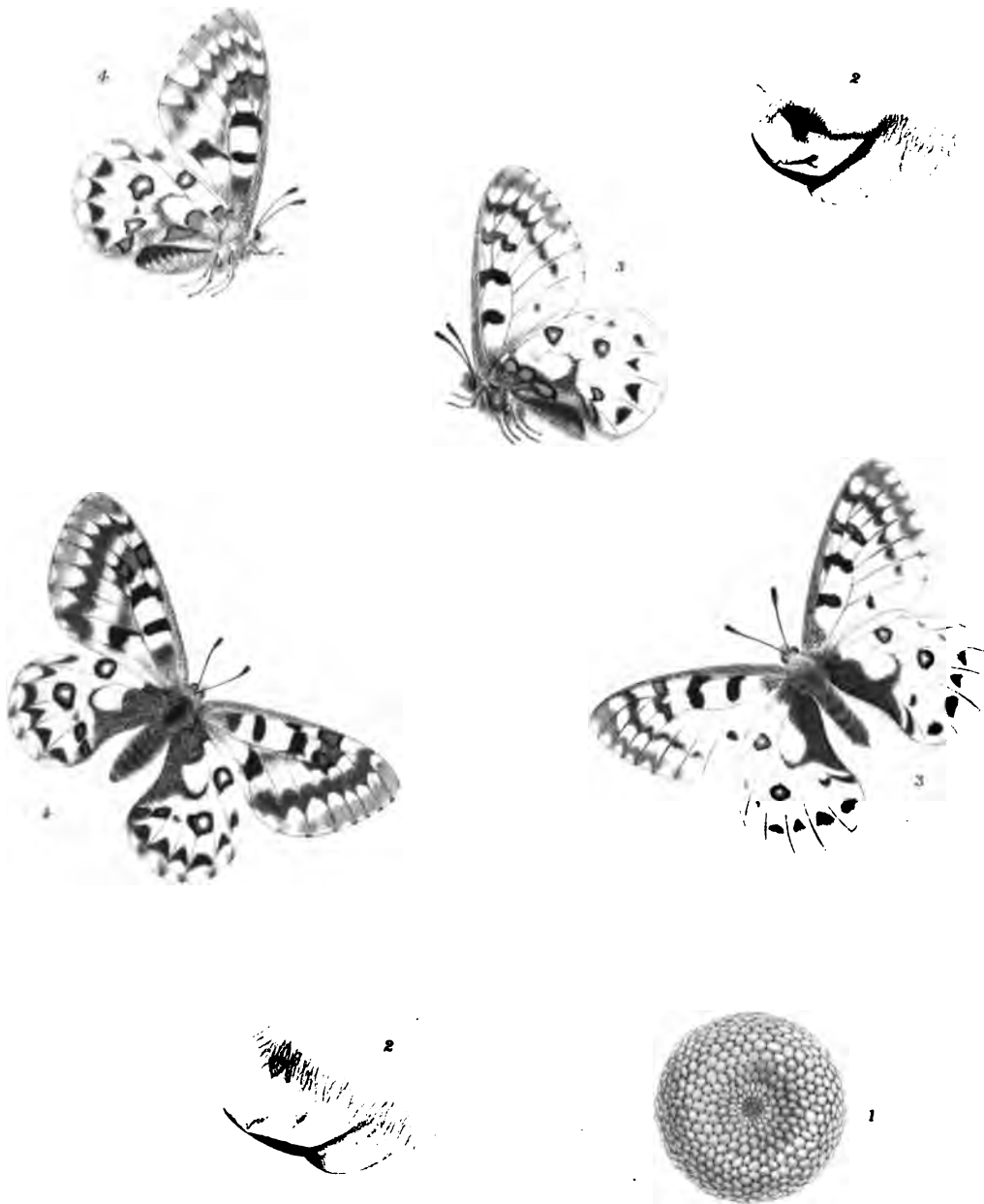
On Stone by Mary Peart.

L. Bowen, lith. Phila.

SMINTHEUS. 1 ♂ in varieties. 2 ♀. (Sayii.)

PARNASSIUS.

III.



In Stone by Mary Peart

L. Bowen, lith. Phila

SMINTHEUS. 1. Egg magnified. 2. Abdominal pouch.
3. Var. BEHRII. ♂. 4. same ♀. (without pouch.)

PARNASSIUS.
IV.



Drawn by Mary Peart.

L. Bowen, lith. Phil^a

SMINTHEUS in var. 1♂, 2, 3, 4, 5, ♀
EVERSMANII, 6, 7, ♂.

PARNASSIUS.

II.



(In Stone by Mary Peart.

L. Bowen, lith. Phila.

SMINTHEUS. 1. ♂ in varieties. 2. ♀. (Sayii.)

PARNASSIUS.
IV.



Drawn by Mary Peart.

L. Bowen, lith. Phil^a.

SMINTHEUS in var. 1♂, 2, 3, 4, 5, ♀
EVERSMANII, 6, 7, ♂.



PARNASSIUS II-IV.

PARNASSIUS SMINTHEUS.

Parnassius Smintheus, (Smin'-the-us) Doubleday, Gen. Diur. Lep. pl. 4, 1847. Edw. Proc. Acad. Nat. Sci. Phil. 1862.

Phæbus, var. Kirby, Cat. p. 511, 1871.

Var. *Sayii*, ♀, Edw. Proc. Ent. Soc. Phil. 1863.

? *Nomion*, Bois. Ann. Soc. Ent. de Fr. 1852.

Var. *Behrii*, ♂, Edw. Trans. Am. Ent. Soc. 1870.

Intermedius, Menetries, Enum. Corp. Anim. Mus. St. Petersburg, 1855, p. 72.

MALE.—Expands from 1.5 to 2.5 inches.

Upper side pure white, semi-transparent at apex and sometimes narrowly along hind margin as far as the upper or even the second branch of median; but most often the margin is bordered by white serrations, anterior to which the transparent space takes the form of a narrow serrated band; primaries have also an extra-discal row of spots, or rather of clusters of scales, sometimes limited to the costal margin, sometimes extending quite across the wing, or of any intermediate length; these spots are either dead-black and conspicuous, or delicate and pale-colored; on the are an irregular black spot, sometimes terminating at the sub-costal nervure, but more often reaching the costal, and in form either sub-rotund or a curved bar, sometimes duplex, that portion between the two nervures then being nearly or entirely separated from the other and advanced towards base of wing; a second spot in cell starting from the sub-costal, sometimes also large, rounded, and at others a narrow bar, but never quite reaching median nervure; costal edge of primaries densely irrorated with coarse black scales, as is also the base and basal portion of cell; beyond cell are two, sometimes three black spots, each pupilled with crimson; this color is often wholly wanting, or is present on the costal spot only; another black spot is usually found on the middle of inner margin, either with or without a crimson pupil.

Secondaries black at base and along abdominal margin quite up to cell, the basal third of which it covers, and often sends a curved branch around the extremity; hind margin sometimes immaculate, but in most cases bordered by a row of rounded black spots and points, which extend more or less across the wing; on middle of costal margin a crimson spot and another on disk, each in black ring and of variable size, but usually small; these spots differ in shades of color in in-

PARNASSIUS II—IV.

dividuals from deep crimson to ochraceous, and frequently are pupilled with white; many individuals also have a black spot near anal angle, and there is very rarely found a crimson dot within the black basal spot that occupies the sub-costal interspace; fringes concolored, black at tips of nervules.

On the under side the markings are repeated, the cellular spots but in part dead-black, the crimson spots as above, and where the patch next anal angle is present it is usually pupilled with crimson; there are also at base four black spots usually more or less covered with crimson, but sometimes this last is wanting on one or two or even altogether.

Body small, black, covered thinly with grey-brown hairs on both thorax and abdomen above, more thickly beneath, the color there being soiled yellow, often with a fulvous tint; legs yellow and black; palpi yellow; antennæ white annulated with narrow black rings; club black.

FEMALE.—Expands from 1.7 to 2.5 inches.

Upper side white, often with a yellow tint, marked generally as in the male, and exhibiting as great degree of variation; the crimson spots larger, sometimes even four being found in the extra-discal row, the fourth occupying the upper median interspace; the spot on inner margin always present and largely pupilled with crimson; that near anal angle duplex, usually with crimson pupils; on primaries the transparent portions extend half way to cell and quite across the wing, enclosing a sub-marginal row of white lunules; the hind margin of secondaries more or less transparent and presenting a series of black crescents or of patches of scales indicating obsolete crescents; there is also frequently a crimson spot at base in sub-costal interspace; on the under side the basal spots vary as in the males, from black to grey, and with or without crimson; abdomen furnished with a blackish, corneous pouch, flattened and curved down posteriorly, and presenting in front a thin, prominent keel; often there is no trace of this pouch.

Var. FEMALE.—The wings melanized and largely transparent. Found at high elevations.

Var. BEHRII.—Characterised principally by conspicuous submarginal black spots on secondaries and orange discal spots, those of costal margin of primaries either white or pale orange. In the female the submarginal spots are very conspicuous and the mesial band on primaries broad; colored spots either orange or red.

From 180 ♂, 42 ♀, taken in Colorado by Mr. T. L. Mead, in June, July and August, 1871; and several specimens received from Dr. Hayden's Yellowstone Expedition, taken in Montana.

EGG.—Diameter .05 inch: chalky-white, button-shaped, the top depressed, base flattened, the surface encrusted with hexagons that diminish as they approach the

PARNASSIUS II—IV.

micropyle, and showing at each corner a minute cell. Deposited upon leaves and stems of *Sedum*.

LARVA unknown.

In this series of specimens there is remarkable variation; in size, the largest being full twice that of the smallest, in the extent of the transparent margin, in the density of the black border to abdominal margin, in the hook projected around the extremity of cell, in the size and shape of the black spots on costal margin of primaries, in the number and size of the crimson spots on same wings, those of the costa varying from one to four; in the black spot on inner margin, varying from nil to a conspicuous patch, with or without crimson centre; in the shape and relative size of the two crimson spots on secondaries, and in the presence or absence of one or two spots at anal angle; in the hind margin of secondaries, sometimes immaculate, at others ornamented with conspicuous black crescents; on the under side also, the four basal spots of secondaries, though always present, vary from grey to black; usually with crimson centres, but frequently without, or show but two or three of the number so marked; the colored spots also on both sides vary from deep crimson to ochraceous and are either with or without white pupils. In short the variation is sufficient to include several distinct species, were not the gradations so regular that it is not possible to draw a dividing line. What I formerly described as *Sayii*, ♀, is undoubtedly but an extreme variation, and I presume this is the *Nomion* of Boisduval. *P. Behrii*, I am satisfied, is another variety, distinguished by the orange color of the spots and the heavy submarginal lunules on secondaries, surely distinct enough to be ranked as a species were it not for the many intergrades between it and the type.

Mr. Mead was fortunate in obtaining numbers of eggs of *Smintheus* by enclosing the females with the food plant. From some of these the drawings on the plate were made by Mr. Konopicky, Artist to the Museum of Comparative Zoology, Cambridge, through the kindness of Dr. Hagen. A large number of drawings of eggs of other species, sent by Mr. Mead, and representing rare Coloradian butterflies, were made by the same distinguished artist. To him also I am indebted for the drawings of the abdominal pouch represented on the plate.

The eggs obtained by Mr. Mead were carefully watched, but, two months after they were deposited, and very near the end of the season, they showed no signs of hatching, though on opening some of them the living larvæ were found. Therefore we are still ignorant respecting their period or the habits of the larvæ. If it had not been for the speedy approach of cold weather, the latter might be supposed to hatch early in September and to spend the winter in webs as do the larvæ of *Melitæa*. It was the opinion of Mr. Mead that this was impossible and that they

PARNASSIUS II—IV.

do not emerge from the eggs till Spring. (Dr. Hagen informs me that it was observed by Schæffer, as long ago as 1754, that the caterpillars of *P. Apollo* were found in the months of March and April in Switzerland, after the snow had gone, and of such size that they must have been just hatched, and have spent the winter in the egg.)

My attention has been called by Mr. Bates and Dr. Hagen to some remarks on the nature of the pouch of the female Parnassian by Von Siebold, and Dr. Hagen has kindly prepared an abstract of what is to be found printed on the subject.

“A paper by Prof. C. Von Siebold was published in the *Zeitung für Wissenschaftliche Zoologie*, 1850, III, pp. 54—61, and reprinted *Ent. Zeit. Stettin*, 1851, XII, pp. 176—185. The first part is only historical to show that next to nothing was previously known about the matter, and that Dr. Boisduval had separated *Doritis Apollinus* generically because its female had no pouch. Siebold doubted that this organ formed part of the body and he found he could easily separate it in *Mnemosyne*, and with more difficulty in *Apollo*, as in this species it is glued more strongly by its broad base to the flat underside of the abdomen. Later, Siebold observed in the collections females of *Apollo* without the pouch, and concluded that it was formed in coition by one of the sexes and would probably assume the form externally of a cast of the male organs. Mr. Höger, *Berichte der Schlesischen Tauschvereiner*, 1844, No. V, p. 3, had before observed that females of *Apollo* and *Mnemosyne* just emerging from the chrysalis had no pouch. The chemical examination by Dr. Baumert showed that this appendage is soluble in caustic alkalic as it would not be if formed of chitine. When separated and boiled in the alkali it easily dissolved and only some brownish oily drops remained.

Siebold quotes Schæffer, who gives a very good history of the transformation of *Apollo*, “*All specimens possessed this pouch which were raised by me.* But in those caught in the mountains the pouch was seldom unhurt; in specimens that had long before emerged, as was evident from the bad condition of their wings, the pouch was very much damaged, so that sometimes I was obliged to look sharply to find the rudiments of it among the hairs of the abdomen.”

Siebold believed that Schæffer's first statement (the italicised words) was a mistake. Mr. Reutti, of Freiburg, had made experiments for Siebold in 1850. He took 50 caterpillars and from them raised 11 chrysalids only, because, as is stated by Schæffer, this species (*Apollo*) is difficult to raise. Between 15th and 20th July, he had 4 ♂, 4 ♀. The latter did not possess the pouch on emerging from the chrysalis. On the 17th, at 1 P. M. one pair united and so remained till late in the night, and on the following morning the female had a well formed pouch on the abdomen. The female died fourteen days later, without any use of the pouch as

PARNASSIUS II-IV.

observed by Mr. Reutti. The formation of the keel in *Apollo*, Siebold thinks depends on the size and form of the organs of the male; the secretion passing between the two claspers would form a keel."

With regard to the localities and habits of *Smintheus* I give extracts from Mr. Mead's letters. On the 8th of June, he writes from Fairplay, South Park, Colorado. "On Tuesday, I took a long walk, about eight miles, down Turkey Creek, finding many unfamiliar insects. Flying along the road were two *Papilio Daunus*, which I captured on the wing. *Papilio Rutulus* was present in moderate numbers. The two *Eurymedon* I send were on the flowers of a species of Larkspur which everywhere sends up its spikes of dark purple flowers. But what delighted me was the abundance of *Smintheus* along the road side. I took thirteen specimens, nearly all males, and many of them so fresh from chrysalis that the wings had not yet thoroughly stiffened. The next day I discovered a favorite resort of this species and in course of the morning captured forty-one. They show much variation in the number and size of the crimson spots. They were solitary in their habits and fond of alighting on flowers, but did not appear to be attracted by damp spots on the ground as is so usual with butterflies. Their flight was well sustained though slow and within a few feet of the ground. All the females taken were provided with the pouch."

On the 22nd, "Yesterday Mr. B. brought me a female Parnassius with an egg adhering to the ovipositor and said that it had deposited several eggs on a "tuft of grass." On further inquiring he was not sure what the "grass" might be, and I conjectured it might be the stone-crop, (*Sedum*) which grows here abundantly, and the flowers of which are very attractive to these butterflies. Accordingly, on searching, I found two empty egg shells on the plant, apparently punctured by some insect. I also found on same numerous eggs of *Euptoieta Columbina*, a species which swarms everywhere on these hill sides." On the 27th, from Turkey Creek Junction, "The Parnassians lay eggs freely. I have about 100, laid indiscriminately on the box, or the cloth covering it, within which I had enclosed a female with the food-plant. Very few were on the plant itself." On the 24th of July, "My eggs show no sign of hatching, but most of them retain their normal contour. In regard to the theory of the formation of the pouch, it was suggested that the period of connection between the sexes of these butterflies must be very long. In that case I should have found many pairs in coitu, whereas I have not so found a single pair." On the 21st of August, "I opened a Parnassius egg to-day and found a half-developed larva inside apparently in a natural state." On the 27th of August, "To day I dissected a Parnassius egg carefully and found a completely formed caterpillar entirely black and somewhat hairy."

In another letter he expresses the opinion that the eggs do not hatch until

PARNASSIUS II—IV.

the following Spring, and on the 5th of September, he writes from Kenosha House, "All the leaves are falling or have changed to their Autumnal tints and naturally the butterflies are fast disappearing." Mr. Mead informs me since his return, that, on the 10th of January, in New York, some of these eggs which had been of late kept in a warm room were found to have hatched, but the larvæ had died from want of nourishment.

Mr. Mead also states that, as a rule, the larger specimens of *Smintheus*, were taken at the lower elevations. The females there also were usually white. On the 8th and 9th of August, at Blue River, in the Middle Park, at an elevation of about 9000 feet, six specimens were taken, the males large and beautifully marked, the colors bright and black spots distinct. But the females were different from any others taken by him, being characterized by broad and dark marginal borders, the black spots intense and the disks of a decided, though pale yellow, the wings little obscured by grey, (see fig 2, pl. 3.) Another of smaller size was of a deeper yellow, and brilliantly adorned, (see fig. 3, pl. 3.)

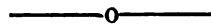
On the 16th of August, several specimens were taken on the top of Berthoud's Pass, at 11,300 feet, where was a grassy space of two or three acres extent. Others were taken on the Peaks around Twin Lakes, at about 12,000 feet. The males did not differ from the usual type, except in size, (see fig. 1. pl. 3,) but the females were melanized, the greater part of the surface of the wings being black and transparent, (see figs. 4 and 5, pl. 3.) The same peculiarity had been noticed in the specimens taken on 5th of August, on the Continental Divide, elevation 11,000 feet, on the trail from Georgetown to Middle Park and near Gray's Peaks. Much of the difference therefore existing between the size of these insects is owing, as might be expected, to the difference in elevation at which they are found, because the severity of the climate or the scanty supply of food on the mountain tops would restrict the growth of the larvæ. But why the general coloration of the male should be identical at all altitudes while the females present such differences or why at great elevations there is such a tendency to melanization in the females alone is not clear unless in some way serving for protection. On this point Mr. Mead writes, "On the bleak summits of the peaks vegetation is scanty and the general aspect is dark and sombre. The rocks themselves are dark-colored, and the lichens which nearly cover them are black and give the prevailing color. Lower down where the "bunch" and "gramma" grass can thrive the prevailing tint is pale brown, even during the height of the growing season, as the dead spears of the last years growth are remarkably persistent." Perhaps this may help to explain the melanism of the *Parnassius* females found in the upper regions. A somewhat similar illustration may be found in *Chionobas*. *C. semidea*, a blackish species, frequenting the Colo-

PARNASSIUS II—IV.

radian summits, while the other species of this genus, *C. chryxus* and *C. Uhlerii*, both ochraceous, are found below.

I do not know why *Smintheus* has been assumed to be a variety of *Phæbus*, as there is no close resemblance between the species, not so much in fact as between *Smintheus* and *Jacquemontii*, Bois. *Phæbus* is larger, of a more opaque white, with a tendency in the males to yellow; the transparent marginal space is far broader and longer than in *Smintheus*, and is wanting in the white serrations that characterize the marginal edge in the latter; the grey sub-apical stripe in *Phæbus* reaches but a little way from costa, usually only to first discoidal nervule; in *Smintheus* it is of all lengths and frequently extends quite across the wing; in *Phæbus* the margin of secondaries is immaculate; in *Smintheus* there are almost always at least traces of submarginal spots on the under side, and more often conspicuous spots on both, reaching the extreme shown in var. *Behrii*; the red spots in *Phæbus* average twice the size of those in *Smintheus*, and those at base of secondaries, in both sexes, are both large and intense; in *Smintheus* they are small, much replaced by black and often wanting altogether or represented by a few scales only; the fringes in *Phæbus* are mixed black and white at the ends of the nervules, the black not distinct; in *Smintheus* they are there largely and distinctly black; the body of *Phæbus* is densely covered with long hair, in *Smintheus* very thinly.

As to the females the differences are still greater and almost preclude comparison. Except in the presence of red on primaries, the female *Phæbus* is much more like that of *Apollo*.



PARNASSIUS EVERSMANNI.

Parnassius Eversmanni, Menetries, Enum. Corp. Anim. Mus. St. Petersburg, Part I, pl. 1, 1865. Scudder, Proc. Bost. Soc. Nat. Hist. 1869.

MALE.—Expands 2.5 inches.

Upper side citron yellow, the nervures black and prominent; primaries have a broad, semi-transparent marginal border, preceded by a row of yellow lunules; next anterior to these a grey stripe reaching from costa to a little below median nervure, and followed by a broad yellow band completely crossing the wing; anterior to this is a second grey stripe and a second yellow band that passes around the end and lower side of cell; both these bands divided into spots by the nervules; in the cell two sub-quadrate yellow spots separated by a grey bar; a similar bar on arc; base of cell and costa throughout sprinkled with black; the hind margin distinctly edged by a yellow line. Secondaries have an obsolete sub-marginal row of grey

PARNASSIUS II-IV.

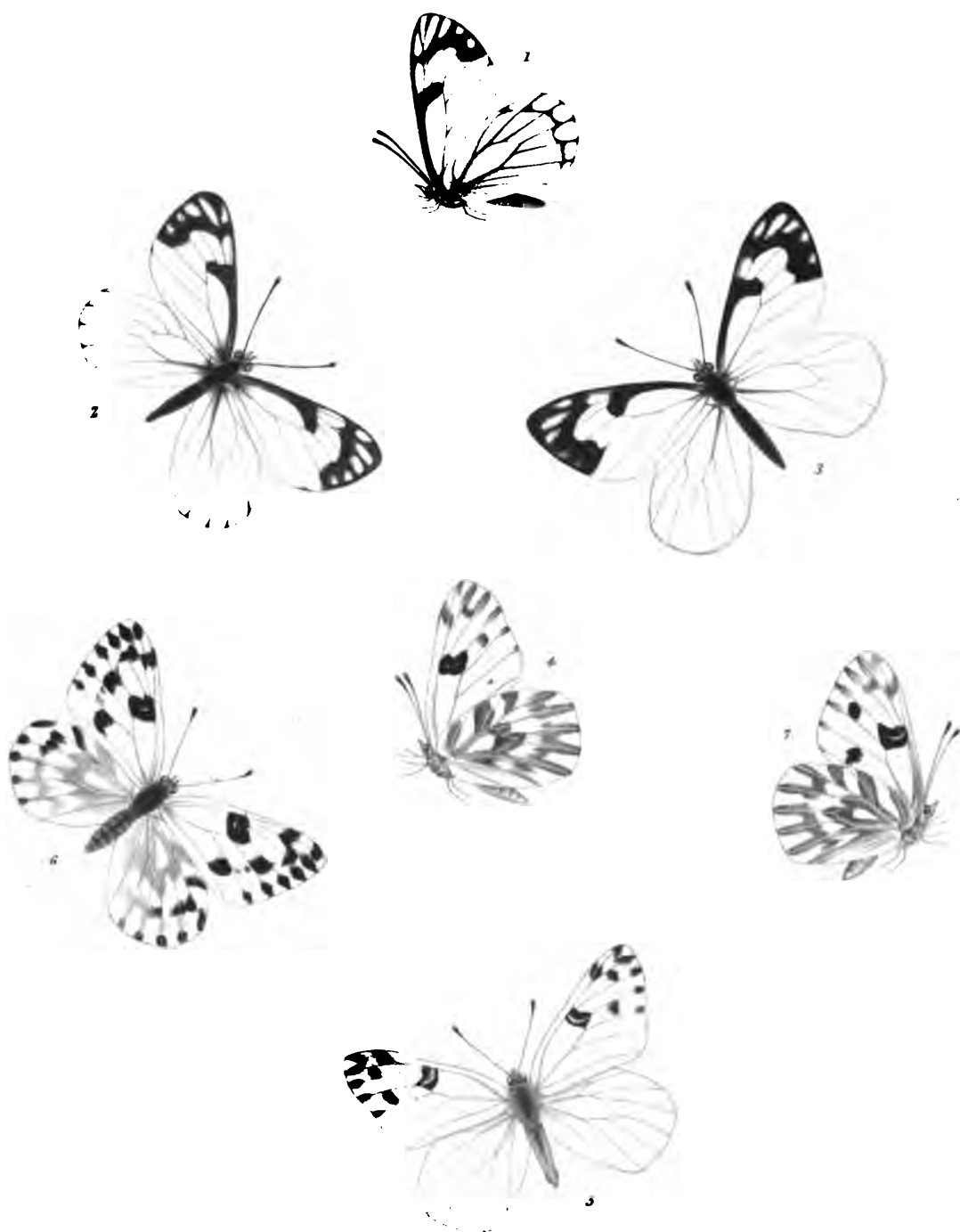
spots, indicated by the presence of a small cluster of scales near outer angle and by a few scales in the several interspaces; the inner margin broadly covered with black, doubly excavated in and below cell, projecting a point to end of cell, and confluent at anal angle with a transverse black stripe that connects with the black discal spot; this spot is pointed with red; on the costa a large red spot within a black ring; fringes black.

Under side yellow, a shade paler, marked as above; secondaries have both costal and discal red spots large, equal, and with white centres; an elongated red spot also within the black spot at angle; at base three red spots, all edged without by black, the two lower ones large and the lowest of all three enclosing a white spot.

Body black above covered thinly with yellow hairs, below densely covered; legs black; palpi yellow; antennæ yellow and black.

From a single male, taken by Lieut. W. H. Dall, in Alaska, at the Ramparts, two hundred miles below Fort Yukon, June 15th. This belongs to the Chicago Academy and is probably the only butterfly remaining of their former large and valuable Collection. Fortunately, not long before the fire, Dr. Stimpson had lent me this unique, and for fear of future loss, I determined to figure it. The only other specimen of which I have knowledge is the one described by Menetries, and found in Siberia. Mr. Scudder has pointed out certain differences that are to be found between the present specimen and that, consisting principally in the presence of red in the discal spot on upper side of secondaries, and in the upper basal spot of under side. The grey bands of our specimen are also narrower. But these are variations that constantly occur among the Parnassians, and I have no doubt both are to be referred to one species.

NEOPHASIA
PIERIS.
I.



Drawn by Mary Peart.

T Sinclair's lth Phil^a

N. MENAPIA. 1. 2. ♂. 3 ♀
P. BECKERII. 4 5 ♂ 6 7 ♀

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NEOPHASIA.

NEOPHASIA MENAPIA. 1—3.

Neophasia Menapia, (Pieris) Felder, Weiner Ent. Monats. III, p. 271, 1859. *Pieris Tau*, Scudder, Proc. Bost. Soc. Nat. Hist. 1861. *Ninonia*, Bois. Lep. de la Cal. 1869.

MALE. Expands 2 inches.

Upper side white with a faint pink tinge; costal margin of primaries partly bordered from base by a black band which curves downward at extremity covering the arc; apical border black, sinuate within, enclosing from three to five subovate white spots, and terminating abruptly on second median nervule; fringes white.

Under side white, the markings of upper surface repeated; the apical spots enlarged; the nervures of secondaries narrowly edged by black scales, and crossed by a submarginal black stripe not always complete.

Body black covered above with white hairs; beneath, thorax white, abdomen yellowish; legs black and white; palpi same; antennæ black; club black, tip pale fulvous.

FEMALE. Expands 2.2 inches. Similar to male.

This fine species is as yet rare in collections. According to Felder it is found in Utah. Boisduval describes it as coming from eastern California; and Mr. Scudder as found abundantly at Gulf of Georgia. Although Felder's description was published in 1859 and translated in Morris's Synopsis in 1862, none of our collectors suspected the identity of the species with *Tau*, Scudder, or *Ninonia*, Bois. till 1870 and after the Synopsis of the Pieridæ in this work had been published. Dr. Behr, in 1869, *Trans. Am. Ent. Soc.* erected for the present and an allied species the new genus *Neophasia*, between *Pontia* and *Pieris*, "differing from the former by the shape of the wing, and from the latter by its gauze-like substance, by the shape and proportions of the head and the slenderness of the thorax and abdomen." According to Dr. Behr, both these species are found inhabiting the pine forest region of the mountain chains parallel to the coast of the Pacific, and he agrees with Mr. Lorquin in the opinion that the larvæ feed on some coniferous tree; "an unusual food for a *Pieris*, but not unknown in the case of certain Australian species."

PIERIS I.

PIERIS BECKERII, n. sp. 4—7.

Primaries produced apically, slightly excavated on costal and hind margins.

MALE. Expands 2 inches.

Upper side pure white, the texture of secondaries slighter than that of primaries, discovering the spots of under surface; base of wings not powdered with black as in allied species; primaries have the apical half of hind margin bordered by small black patches or clusters of scales, diminishing in size to middle of margin; anterior to these two similar sub-apical patches and a third in upper median interspace; on the arc a dense black subrectangular spot (not reaching the costa) with a central white streak. Secondaries immaculate. Fringes white except against the apical spots, there black.

Under side white; the nervules at apex and on upper hind margin bordered by black scales and suffused with greenish yellow; the spot on interspace black and as on upper side; cellular spot enlarged, its base broadened and posterior edge excavated.

Secondaries have all the nervures and their branches yellow; those terminating on hind margin edged by broad bands of yellow green reaching to middle of disk and connected anteriorly; three large spots of same color about the cell, two being at the outer angles, and one above and reaching the costa; another large triangular subapical spot on costa; the nervures at base also banded with green; all these bands and spots slightly sprinkled with black scales.

Body above covered with grey hairs; beneath, abdomen yellowish, thorax white; legs white; palpi white, grey on upper side and at tip; antennæ white above and at base below, beyond brown; club black nearly covered with rows of white scales; tip pale fulvous.

FEMALE. Expands 2 inches.✓

Primaries less produced and broader than in male; same shade of color; the marginal spots enlarged and extended to second branch of median; in addition to the three submarginal spots, which are also enlarged, is another in submedian interspace and a streak below this along inner margin; the cellular spot much enlarged, rhomboidal, with slight central streak; secondaries have a patch on costa and four on the marginal nervules commencing at and posterior to subcostal; also an interrupted submarginal stripe opposite cell, posteriorly indistinct; under side

PIERIS I.

as in male, except that a round black spot appears in submedian interspace on primaries.

Taken by Mr. Henry Edwards, at Virginia City, Nevada, April 1870, on flowers of *Brassica*. Four individuals were taken, and these were the only ones seen. This fine species is allied to *Protodice* and *Occidentalis*, but is abundantly distinct.

At the request of Mr. Edwards I have named it in honor (using his own language) "of one of my earliest and most valued entomological friends, Dr. Ludwig Becker, who laid down his noble life in the cause of science in Australia. He was attached as naturalist and draughtsman to the great expedition of Burke and Wills across the continent from Melbourne to the Gulf of Carpentaria, and died of fatigue and privation at Cooper's Creek, New South Wales, in 1861. The friend of Humboldt, Milne Edwards and Owen, he possessed a most observant and philosophical mind and his papers upon various subjects connected with his favorite science testify to his vast and varied erudition. I have always promised myself that I would commemorate our friendship by attaching his name to some species I might discover, and the present is very appropriate as a few moments before I took my first specimen of this *Pieris* I was thinking very much of Becker and of the many happy collecting days we had passed in the forests of Australia."

PIERIS.
III.



Drawn by Mary Peart

T. Snelgar's 18th Phila.

VERNALIS 1 2 ♂. 3, 4 ♀
VIRGINIENSIS 5 6 ♂, 7 8 ♀

PIERIS II.

PIERIS VERNALIS. 1—4.

Pieris Vernalis, Edwards, Proc. Ent. Soc. Phil. 1864.

MALE. Expands 1.7 inch.

Upper side white; primaries have small black serrated spots at the extremities of the apical nervures, preceded by an imperfect abbreviated row of small black patches; a black bar on the arc. Secondaries more delicate, showing the markings of under side.

Under side of primaries white; the spots reproduced, but pale colored and dilated, those at apex tinged with greenish grey; an additional black patch on submedian interspace, sometimes wanting. Secondaries have all the nervures broadly edged with greenish grey so that none of the white surface appears except in narrow stripes in the cell and interspaces; near hind margin a band formed by grey serrations connecting the nervules.

Body above covered with blue grey hairs; beneath, thorax grey white, abdomen yellow; palpi yellowish; antennæ black above, annulated below with white; club black tipped with ferruginous.

FEMALE. Expands 1.8 inch.

Color less pure, similarly marked, the spots larger, the discal bar conspicuous: secondaries show clusters of grey scales on costa and at outer angle and in the interspaces on the margin; under side as in the male.

I have taken this species at Coalburgh, W. Va., in the month of March, it being one of the earliest butterflies of Spring, but it is exceedingly rare. I have also received it from the vicinity of Philadelphia. It was brought by Mr. Ridings, in 1864, from Colorado and may perhaps be much more abundant westward. It much resembles *Protodice*, and would be usually taken for a variety of that species, but besides its much earlier flight, it presents decided differences, being smaller, of a less pure white and quite differently marked on the under side of secondaries. Its nearest allies are *Sysimbri*, Bois., a Californian species, and *Calyce*, Edw., from Nevada.

PIERIS II.

PIERIS VIRGINIENSIS. 5—8.

Pieris Virginiensis, Edwards, Trans. Am. Ent. Soc. 1870.

MALE. Expands 1.7 inch.

Upper side white, less pure than *Oleracea* and much obscured by grey brown scales which are scattered over the whole surface but are dense on apex, costa and basal half of primaries and at base and along the subcostal and median nervures of secondaries; a grey patch also on costa of secondaries.

Under side white, the nervures all bordered with grey brown, most conspicuously on sub-median of both wings and the branches of this nervure on secondaries; shoulder pale orange.

Body above blue grey, beneath white; palpi white tipped with grey; antennæ blackish above, finely annulated with white below; club black tipped with yellowish.

FEMALE. Expands 1.9 inch.

Similar to male, the surface usually still more obscured.

This species is allied to *Oleracea*, from which it may be readily distinguished by the shape of its wings, which are longer and narrower, by their texture, which is more delicate, and by the constant presence of grey scales over the surface. In the Kanawha district it replaces *Oleracea* which is yet unknown there. It is not uncommon in the month of May, frequenting open woods rather than gardens, and in this respect differing in habit from the allied species. I have never met with it later than June, though *Oleracea*, in the Northern States, is most abundant after that month and continues breeding till the early autumn frosts.

I have received specimens of *Virginiensis* from Mr. Wm. Saunders of London, Canada, and am informed by him that it is there a rare insect.

The larvæ of this group of *Pieris* feed upon garden vegetables, Brassica, Raphanus, Nasturtium, and allied plants in a wild state, and are sometimes exceedingly destructive. The female butterfly deposits great numbers of long slender pointed eggs upon the under side of the leaves, often a score or more upon a single leaf. These eggs are greenish white in color, and stand at right angles to the surface. To an inexperienced person they might seem to be eggs of some fly, or the result of a disease of the leaf itself, but they would not be suspected to be the eggs of any butterfly.

In four or five days the young larvæ emerge, one tenth of an inch in length, green in color, requiring a keen sight to discover them. At once they attack the leaf eating a small hole and to the margin of this they return when disposed to feed till all the surrounding parts are eaten away. The large leaves of horse radish may be seen entirely consumed in this way leaving but the skeleton untouched.

PIERIS II.

When at rest the larvæ lie extended upon the surface of the leaf, generally along one of the ribs or in a depression, and as they retain their green color to maturity they are effectually screened from notice. When mature they are about one inch in length, cylindrical, covered with fine white papillæ from each of which is emitted a single short hair. The chrysalids are brownish white marked anteriorly by a few points and short lines of black, and are distinguishable from those of any other genus by angular ridges on the back of the wing covers and head. They may be seen attached to fences and buildings near the food plant, or to the plants themselves. This description will apply either to *Oleracea*, or *Rapae*, which in both larval and chrysalis states are extremely alike. And doubtless will be found to apply as well to the same stages of *Virginensis*.

Fortunately multitudes of these insects are destroyed by small ichneumon-flies which deposit their eggs in the very young larvæ. From these proceed grubs which feed upon the substance of the larva, but instinctively avoid any vital part. In due time the larva becomes a chrysalis and shortly after the matured grubs eat their way out and soon become flies, while nothing is left of the chrysalis but the empty shell.

Until within a few years, *Oleracea* was considered to be our only eastern species of this group, and although in its larval state somewhat destructive yet was never so much so as to excite alarm. But of late *P. Rapae*, an European species, and a pest of that continent, has been introduced, first being seen in the vicinity of Quebec. From probably two or three individuals and from that centre it has rapidly increased, and, year by year, made its way South and West till it swarms in many parts of New York and New Jersey and in Ohio. Already the loss to the cabbage crop alone begins to be estimated at millions of dollars annually, and it is probable that this species will continue to extend its area till it has taken possession of the whole continent east of the Rocky Mountains.

ARTIFICIAL PAPILIA.

I.



Drawn by Mary Leart.

Printed by J. W. Smith.

LEAKIPTII 1 2 3 4 5
C. LEPTII 6 7 8 9

ANTHOCARIS I.

ANTHOCARIS REAKIRTII. 1—4.

Anthocaris Reakirtii, Edwards, Trans. Am. Ent. Soc., 1869.

MALE. Expands 1.3 to 1.5 inch.

Upper side soiled white, blackish at base; primaries have a large bright orange apical patch, as in *Sara*, edged on the apex by black as in that species, with serrated black spots also upon the hind margin; a narrow bar, straight, slightly irregular on its edges and of nearly uniform intensity of black, crosses the wing from middle of costa to inner angle; costal edge much specked with black scales; fringe alternate white and black.

Secondaries have three or four patches of black at tips of upper nervules; fringe white, black at ends of nervules.

Under side white; the orange spots reduced and paler; costa of primaries and the whole space on apex and margin outside the orange, densely covered with green patches; on the arc a bent bar; secondaries densely and uniformly covered from base to margin by large green patches.

FEMALE. Expands 1.7 inch. Same color as male; costal margin slightly specked; the orange spots paler and narrower, reaching from costa to hind margin, not edged by black on inner side, but on outer by a sinuous band, between which and the apical border is a series of serrated spots, often confluent; the band connected with the triangular marginal spots by black nervules; on the arc a bent bar, starting from costal edge; beneath as in the male, except that costa, margins and secondaries are much less spotted with green.

California. Vicinity of San Francisco. From specimens in my own collection and those of Messrs. Reakirt and Henry Edwards, and Dr. Behr.

The distinctness of the present species from *Sara* was first pointed out to me by Mr. Reakirt and I have since learned that our Californian lepidopterists had assured themselves of the same thing. But I am not at all certain that this is not the species intended to be described by Dr. Boisduval. His description applies equally well to either form, but as our collectors have agreed in calling the larger *Sara*, I have no hesitation in following them.

The males of the two species much resemble each other on the upper side except in size, *Sara* expanding more by three or four tenths. In *Sara* ♂ the black discal band is waved and of faint color. In *Sara* ♀ the discal bar is separated from the costa. In *Reakirtii* ♂ the costal margin of primaries is always irrorated, and the margin of secondaries is never without black spots. On the under side it is much

ANTHOCARIS I.

more and differently marked with green. The yellow form is also wholly wanting in *Reakirtii*. In a letter from Mr. Henry Edwards dated September, 1869, he says.—“This species is one of the earliest insects of our spring, and may be seen even so soon as March if the season be favorable. As far as my own observation goes it is found generally in oak groves, flying about flowers, and is but rarely seen in open pastures; liking shade and flying rapidly from flower to flower. It rarely alights, and is difficult to take on the wing. I have met with it chiefly in the neighborhood of San Francisco. As to *Sara*, I first met with it two years ago in Santa Clara Co., and was at once struck by its larger size, the yellow color of most of the females, and the absence of the irrorated line along the anterior margin, as well as by the much fainter green markings on the under side of lower wings. Unlike *Reakirtii*, this species seems to prefer the open fields, flies much more slowly, and alights often upon flowers of Brassicæ, Nasturtium, &c. I am so accustomed to the two forms that I can now distinguish them by the flight alone. *Sara* appears early in May, or probably in the warmer parts of the State as soon as April, and continues on the wing until August. Probably at least one-half the females are more or less tinged with yellow.”

ANTHOCARIS COOPERII. 5—8.

Anthocaris Cooperii, Behr, Trans. Am. Ent. Soc., 1869. *Angelina*, Boisduval, Lep. de la Cal'e., 1869.

MALE. Expands 1.4 inch.

Upper side soiled white with a yellow tinge, much irrorated with black at base of wings; primaries have a small pale orange sub-apical patch, as in female *Reakirtii*, edged at apex by spots of greenish-black, partly united into a band; on the arc a narrow, nearly straight blackish bar, not quite reaching the costa; fringes white, the nervules on primaries largely and on secondaries slightly tipped with black.

Under side of primaries white; the orange patch repeated, but paler; apex tinged with green and, as well as costa, somewhat irrorated with greenish-black; discal spot nearly obsolete.

Secondaries much covered by yellow-green patches, most dense next base.

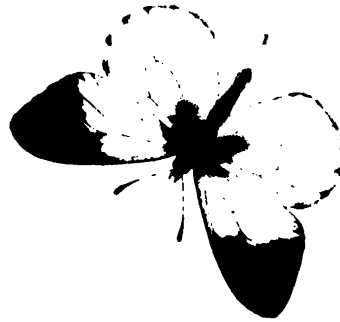
Body above grey, beneath, thorax covered by yellow hairs; palpi white tipped with grey.

FEMALE. Expands 1.5 inch. Same color as male; the orange patch wanting, but the nervules within the space orange; apical spots separated and less distinct. Under side of primaries have the apex decidedly greenish-yellow; in other respects like the male.

From San Diego, California; Collection of Dr. Behr.

ANTHOCARIS.

III.



Drawn by Mary Fearn.

Bowen & Co. Lith. Phila.

SARA 1.2. ♂ 3.4 ♀ 5 ♀ Var.

ANTHOCARIS II.

ANTHOCARIS SARA. 1—5.

Anthocaris Sara, Boisduval, Ann. Ent. Soc. de Fr. 1852.

MALE. Expands 2 inches.

Upper side pure white, blackish at base; primaries have a large bright orange apical patch, broadly edged at apex of wing by black and enclosing on hind margin two serrated black spots; posteriorly edged by a broad black band which extends from costal edge across the cell, covering the arc, and connects with a waved band of irregular width and less intensity of color that reaches to inner angle; costal margin slightly specked with black; secondaries usually immaculate, but sometimes marked by small black patches on the ends of the nervules, especially at and near the outer angle; fringe of primaries alternate yellowish and black, of secondaries white, except at tips of nervules where it is black.

Under side white tinged with yellow on hind margin and apex of primaries; the orange spot reduced, pale; apex specked with black; on the arc a broken black bar. Secondaries have the nervules yellow, and the surface covered thinly and irregularly with greenish points and patches.

Body above covered with grey hairs; beneath, abdomen yellowish, thorax white; palpi white tipped with grey; antennæ brown above, whitish below; club black, white at tip.

FEMALE. Same size.

Upper side color of male; the orange patch paler and narrower, not bordered with black on inner side, but edged without by a sinuous blackish band or stripe more or less complete, between which and the blackish apical border are serrated white spots, sometimes confluent; discal mark, a bent bar not extending beyond the arc: under side as in male.

Variety A. Female.—Upper side pale yellow, marked as in the type.

California. Found especially in Santa Clara County: rare in vicinity of San Francisco, where it is replaced by *A. Reakirtii*. According to Mr. Henry Edwards, nearly one half of the females are of the yellow variety.

(See notes on *A. Reakirtii*.)

COLIAS.

I.



Drawn by Mary L. Art.

Bowen & Co. Lith. Phila.

ALEXANDRA 12 ♂ 3 4 ♀ HELENA 5 6 ♂ 7 ♀

COLIAS I.

COLIAS ALEXANDRA. 1—4.

Colias Alexandra. ♂ ♀. Edwards, Proc. Ent. Soc. Phila. ii, p. 14. 1863.

MALE. Expands from 1.9 to 2.2 inches.

Upper side bright lemon-yellow, with a greenish tinge on the inner half of secondaries; base of wings and costa of primaries slightly powdered with black scales; fringe yellow.

Primaries have a broad black marginal band, the inner edge of which is usually not crenated, but is parallel to the margin, with a small angular projection upon the submedian interspace; at the apex it curves slightly and extends a little way along the costal margin, less than in *C. Philodice*; on the inner margin it terminates as in that species; this band is crossed to the fringe by the yellow nervules; on the arc is a narrow black mark, in length not exceeding half the arc, sometimes a little dilated and then enclosing a yellow point.

Secondaries have a narrow margin terminating acutely before the anal angle, crenated within and crossed by the yellow nervures; sometimes on the arc is a minute spot of paler color, but this is usually wanting.

Under side: primaries same yellow as above, pale at apex and on inner margin; costal margin slightly powdered with minute black scales and edged with pale roseate; discal spot as above; otherwise immaculate. Secondaries wholly greenish-yellow, covered with black scales; discal spot small, rounded, silver-white, without a border; otherwise immaculate; nor is there a pink tinge at base as in *Philodice* and many species of *Colias*; edge of costa pale roseate to the end of the costal nervure only; fringe of both wings yellow.

Palpi pale yellow; legs and antennæ pale roseate; club blackish above, brownish-yellow below and at tip.

FEMALE. Expands 2.3 inches.

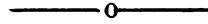
Upper side less brightly colored, having a greenish tinge throughout, and without a marginal band; fringe yellow and otherwise as in the male.

Variety *a.* Female; expands 2.1 inches.

Primaries have the apex bluish-white, and an obsolete macular band, indicated only by clusters of scales along the margin and apex and by a line of scales anterior to these; on the under side of secondaries the hind and inner margins have a bluish tint.

COLIAS I.

From Colorado. Mr. James Ridings, who collected in that region in 1864, informs me that he took this species at Empire City, high up in the mountains near the Snowy Range, in the month of August; that it was moderately abundant but very wild and difficult to capture on account of the unevenness of the ground.



COLIAS HELENA. 5—7.

Colias Helena (Hel'-e-na) ♂ ♀. Edwards, Proc. Ent. Soc. Phila. ii, p. 80. 1863

MALE. Expands 1.5 inch.

Upper side greenish-yellow, deepest colored on secondaries, sprinkled with black on the costa of primaries and at the base of the wings; border of primaries broad, black, much advanced on the costa, not crossed by yellow nervures; that of secondaries of medium width, short, terminating midway on the margin; both borders erose on inner edge; primaries have a slender, black, discal mark; secondaries only an indistinct pale point; fringes rose-red.

Under side: primaries in color much as above, with a similar discal mark; secondaries dark greenish-yellow, covered with fine black scales; discal spot small, round, silver-white, with no border; at the base a few rosy scales; body black above, yellow beneath; collar rosy; palpi yellow with rosy hairs at extremity; legs and antennæ rosy; club brown.

FEMALE. Expands 1.7 inch.

Upper side soiled white with a slight green tinge; primaries have a brownish-black border, very broad at the apex, terminating in a point at the inner angle, the inner edge on the inferior nervules emarginated; secondaries have a narrow border at outer angle only; discal spots as in the male; fringes rose-red.

Under side: primaries same white as above, the apex and costal margin washed with yellow; secondaries as in the male.

From Mackenzie's River, taken by Mrs. Ross, in 1862.

COLIAS.

II.



Drawn by Mary Leach

Engraved by J. G. F. 1847

CHRISTINA 12 ♂ 3 4 ♀ BEHRII 5 6 ♂ 7 ♀

COLIAS II.

COLIAS CHRISTINA. 1—4.

Colias Christina. ♂ ♀. Edwards, Proc. Ent. Soc. Phila. ii, p. 79. 1863.

MALE. Expands 2.1 inches.

Upper side: primaries bright yellow, with a large deep-orange patch on the disk, which reaches neither the costa nor the base, and occupies about one-half the space inside the border; the border is broad, black, crossed by the yellow nervures nearly or quite to the margin, and resembles *C. Eurytheme* in the outline of its inner edge; discal spot small and black; edge of costa rose-red.

Secondaries lemon-yellow with a pale orange patch which is confined to the outer limb, reaching neither the costa nor abdominal margin; the border narrow, with a very even inner edge, also crossed by the yellow nervures; discal spot large, deep-orange; fringe of both wings long, rose-red.

Under side: primaries same yellow, the basal half pale-orange; costal margin sprinkled with fine black scales; between the nervures three or four sub-marginal brown points or clusters of scales; discal spot as above.

Secondaries more greenish, covered uniformly with fine black scales; an obsolete sub-marginal row of brown points; discal spot small, round, silver-white, in a reddish-brown circlet about which are a few scales of same color; a few rosy scales at the base; fringe and costal edge of each wing rose-red: palpi pale yellow; legs and antennæ rosy; club blackish.

In three specimens out of four there were no traces of the sub-marginal points.

FEMALE. Expands 2.5 inches.

Upper side wholly pale yellow, without a border; discal spots as in the male, that of secondaries being more yellowish; fringes rose-red.

Under side paler and immaculate, excepting the discal spots; the basal half of primaries brownish-yellow instead of orange; otherwise like the male.

Taken at the portage of Slave River, by Mrs. Bernard C. Ross, late of Fort Simpson, in 1862.

COLIAS II.

COLIAS BEHRII. 5—7.

Colias Behrii. ♂ ♀. Edwards, Proc. Ent. Soc. Phila. vi, p. 201. 1866.

MALE. Expands 1.5 inch.

Upper side greenish-yellow, much sprinkled with minute black scales, especially on primaries; base of wings black; hind margin of primaries broadly edged with black, which is covered with greenish-yellow scales and not clearly defined on the inner side; the marginal border of secondaries is clear black, of medium width, well defined on inner side, curving regularly, with no prominent projections, and terminating a little short of the anal angle; costa of primaries rose-colored; discal spot a minute yellow streak edged with black scales; discal spot of secondaries small, round and yellow; fringes greenish-yellow.

Under side greenish-yellow, paler than secondaries above, entirely specked with black scales, except on inner margin of primaries, where the color is whitish; discal spot of primaries a yellow streak, of secondaries minute, yellow, edged with a few rosy scales; costa of each wing rose-colored; abdomen and palpi greenish-yellow; legs and antennæ rose-colored.

FEMALE. A little larger than the male, paler green, the marginal black border less distinct and more expanded at apex of primaries; fringes both above and below roseate, in contrast to the fringes of the male, which are yellow.

From two males, and one female, received from Dr. Herman Behr, San Francisco, and taken by members of the State Geological Survey among the Yosemite mountains, at an elevation of about 10,000 feet above the sea.

COLIAS.

III.



Drawn by Mary Peart

Bowen & Co. Lith. Phila.

EURYTHEME 1 2 3 4 5 6 7

COLIAS III.

COLIAS EURYTHEME. 1—6.

Colias Eurytheme, (Eu-ryth'-e-me), Boisduval, Ann. Ent. Soc. de Fr. 1852. *Amphidusa*, Boisd. ib. *Edusa*, Var. *Californica*, Ménétériés, Cat. Imp. Acad. Sci. St. Petersb. *Edusa*? Boisd. and Lec. p. 61.

MALE. Expands 2 to 2.3 inches.

Upper side uniform bright orange, with an opaline reflection; costal and abdominal margins sulphur yellow; base of primaries covered with black scales which extend a little way along inner margin; base of secondaries covered in same manner as also part of cell and of lower median interspaces; primaries have a large black sub-ovate discal spot; marginal band broad, black, crossed at apex by yellow nervules, the general direction of the inner edge, from submedian to disco-central, being parallel to the margin, sometimes crenulate and sometimes nearly straight, with a slight projection on the sub-median; from the disco-central curving to costal edge and diminishing to a point at about one-third the distance from apex; on inner margin throwing out an acuminate branch, which is depressed on upper side and terminates nearly at the middle of margin.

Secondaries have the border one-half the width of that of primaries, arose within, commencing half way between the costal and upper branch of sub-costal and ending at first branch of median; a rounded deep orange discal spot, upon the anterior edge of which is sometimes a dot of same color; fringes yellow at base, roseate at extremity.

Under side deep yellow, usually with an orange tinge upon disk of primaries; costal margin of primaries and disk lightly powdered with fine black scales; a sub-marginal transverse row of small black patches, the three lower distinct, others more or less obsolete; three black dots in the sub-costo-apical interspaces near the edge; discal spot black, oval, enclosing a streak which is yellow, or sometimes margaritaceous.

Secondaries have a row of faint brown points parallel to margin, a small patch on costa; a round discal margaritaceous spot, in a brown ring, about which is a second, paler and broader; at insertion of median a small red spot; costal edges and fringes of both wings roseate.

Body above covered with greenish-yellow hairs, which, on the collar, are roseate at extremity; abdomen black above, partly covered with yellow scales; under side yellow; legs pale roseate; palpi yellow beneath, black above; antennæ and club pale roseate.

COLIAS III.

FEMALE. Expands 2.5 inches.

Upper side orange, less pure than in male, much obscured by black scales at base of primaries and over whole of secondaries; often, however, the color is greenish-yellow with a deep orange tint upon the disk and inner margin of primaries and a slight flush of same over secondaries; primaries have the marginal border broad, dilated at apex, much advanced on costa, the inner edge not clearly defined, with two deep sinuses on the sub-median and upper median interspaces; within the border a transverse, yellow, macular band, of which the spot in median interspace is usually wanting; discal spot large, nearly round.

Secondaries have the border irregular, dilated at upper end and partly enclosing a yellow macular band; discal spot and fringes as in male.

Under side pale yellow, or greenish-yellow, (according to the prevalence of orange or greenish-yellow on upper side,) tinted with orange on disk of primaries; the sub-marginal patches and points distinct; discal spots as in male, that of primaries having the central spot conspicuous.

Variety A, ♀. Color above and below greenish-white; marked as in the type.

LARVA: mature, length 1.4 inch. Dorsal surface dark velvety green, finely plicated transversely. On either side a narrow white line on which are irregular patches of bright vermillion, some of which are occasionally shaded with orange yellow. Under side green.

CHRYSLIS light green, with a stigmatal yellow line, above which is a brown point on each segment; a sub-dorsal brown patch commencing at edge of wing covers and occupying two or three segments. Length .95 inch.

EGG greenish white, translucent, pointed at one end and truncated at the other, ribbed longitudinally with transverse striæ between. Length, .036 inch, greatest width .009 inch.

From notes by L. K. Hayhurst, Esq., Sedalia Missouri, who succeeded in raising the larvæ from eggs deposited by a female in captivity. The larvæ fed upon *Trifolium repens* (white clover) and *T. reflexum* (Buffalo grass). The eggs hatched July 1st; changed to pupæ July 15th and the butterflies emerged July 24th. Mr. Hayhurst adds, "the larvæ are scarcely different from those of *C. Philodice*, except in being larger and having the lateral spots of a brighter scarlet."

According to Dr. Behr, "the caterpillar is of a lively green with a brimstone colored stripe above the feet, and feeds upon a species of *Hosackia*, and probably other leguminous plants." This species is widely distributed over the western part of the Continent, both in the Mississippi valley and on the Pacific slope. Dr. Behr says "it is very common in California," and it also is in the vicinity of New Orleans and in part of Texas. Very rarely specimens have been taken east of the Alleghanies. I have never met with it myself, either in New York, New Jersey or even

COLIAS III.

in West Virginia. Nor have I received it from Georgia, although large miscellaneous collections have been sent me from that State. Mr. Reakirt has taken a single specimen at New Castle, Delaware. This is supposed to be the species formerly mentioned by authors as *Edusa*, which it somewhat, but by no means closely, resembles. Boisduval & Leconte say of this *Edusa*, "it is found in the Spring, but especially in the Autumn in the fields in the vicinity of New York, less common than *Philodice*," (a species which swarms in that region). All which of course is in error. The common and lazy practice of pronouncing American insects identical with European has led to endless perplexity. No genus has suffered more in this respect than *Colias*, as the names *Hyale*, *Palæno*, *Phicomone*, *Nastes*, *Edusa*, and *Chysotheme* show. Excepting *Nastes*, which comes to us from Labrador, it is more than doubtful if one of these is American.

It is really difficult to say whether the present species is the one designated as *Eurytheme* by Dr. Boisduval or not, as his short and very general description would attach to almost any orange *Colias* whatever. But of late years this name has been so applied by American lepidopterists, the species I have separated as *Keewaydin* being regarded as a variety only.

It is uncertain also what the brief mention of *Amphidona* was intended to cover. This is described as "wholly like *Edusa*, having the border of the same form and breadth" only wanting the glandular space that characterises that species. Its locality is given as the North of California, and we are told that it is "perhaps but a variety of the preceeding," (*Eurytheme*.) This conclusion seems to me well drawn as no such form is known in any of the large Californian collections to which I have had access.

COLIAS.

IV.



Drawn by Mary Peart

Bowen & Co Lith Phila

KEEWAYDIN. 1 ♂. 2 ♀. 3 ♀. 4 ♀. 5 ♀. 6 ♂. 7 ♂. 8 ♀. 9 ♀.

COLIAS IV.

COLIAS KEEWAYDIN, n. sp. 1—9.

MALE. Expands from 1.6 to 1.8 inches.

Upper side sulphur yellow, the disk of both wings more or less tinted with orange, which occasionally has an opaline reflection; on primaries the orange is deepest next base and on inner margin, towards hind margin insensibly passing into yellow; on secondaries the tint is less deep, extends quite up to the marginal border but fades into yellow towards costal and abdominal margin; base thickly powdered with black which extends a little way along inner margin of primaries, and, on secondaries, covers part of the cell and median interspaces; discal spot of primaries black, sub-ovate, often much compressed, but sometimes almost circular; marginal border black, of median width, crossed at apex and often throughout by yellow nervules; regular on its inner edge, with a slight projection on sub-median and an indentation below that nervure, not quite parallel to the margin in its general course, but approaching it somewhat near the disco-central; beyond this, curving roundly towards costa and terminating (usually quite abruptly) on costal edge at about one-fourth distance from apex to base; on inner margin projecting a short, attenuated spur.

Secondaries have the discal spot deep orange, occasionally with a small attendant spot on its anterior edge; the marginal border narrowed, usually regular, but sometimes a little excavated between the nervules, commencing above the upper branch of sub-costal and ending acutely at or a little beyond the first branch of median; fringes yellow, edged slightly without by roseate, more decidedly at apex of primaries.

Under side uniform deep yellow; costal edges and fringes roseate; costal margin of primaries and the whole of secondaries much sprinkled with fine black scales; discal spot of primaries sub-ovate, sometimes triangular, black, with a dot or streak of yellow, or sometimes white, in the centre; the sub-marginal row of brown spots faint, consisting of but a few scales and partly obsolete; secondaries have a similar row of spots, a small elongated patch on costa and a roseate spot at insertion of median; discal spot large, margaritaceous, in a narrow brown ring about which is a paler halo; the attendant spot, if any, a dot in the centre of a similar ring.

Body covered with yellow-grey hairs which are tipped with faint roseate on the collar; abdomen black partly covered with yellow scales, beneath yellow; tho-

COLIAS IV.

rax yellow; legs roseate; palpi yellow, dark on upper side, roseate at extremity; antennæ and club roseate.

Variety A, ♂. Upper side pale yellow with a very slight tinge of orange on disk of primaries; sometimes wholly without orange and then uniform lemon-yellow; the marginal borders also very pale. (Fig. 7.)

FEMALE. Expands 1.7 to 2.1 inches.

Upper surface yellow, the secondaries having a greenish tint; disk of primaries slightly tinted with orange; primaries have the marginal border broad, more or less excavated between the nervules and enclosing a macular yellow band, usually complete, although the spot in median interspace is often but faint; discal spot large, black, circular or ovate, and sometimes enclosing a central spot.

Secondaries have the border abbreviated posteriorly and dilated towards outer angle, there enclosing two or three yellow spots of a band which disappears in the ground color; discal spot as in male.

Under side greenish-yellow except at base and on disk of primaries which are deep yellow; discal spot of primaries large with a central white or yellow spot.

The usual type from California and Texas.

Variety A, ♀. Upper side of primaries bright orange and of secondaries pale orange, both wings much obscured by black scales; macular band yellow. From Illinois. (Fig. 5.)

Variety B, ♀. Color above greenish-white, the secondaries with a faint yellow tint; beneath secondaries and apex of primaries more decidedly yellow; marked as in the type. From California and Texas.

Larva unknown.

Found in the valley of the Mississippi from Nebraska and Illinois to Texas and westward to the Pacific, occupying much the same region as *Eurytheme*, but apparently less common and more local than that species. Also occasionally found in the Middle States and Canada.

My attention was first called to the differences between the two species passing under the name of *Eurytheme* by Dr. Behr, in 1865. In a letter then received from him, he says, "These are two good species but have hitherto been considered as one. I am certain either of the two is different from the European *Chrysotheme*" (of which species Dr. Boisduval had considered *Eurytheme* as probably a variety. "It is easy enough to characterise the males, but as to the females, I am at a loss myself; and at the same time the two species are easy to recognize when on the wing." And again in 1868, "I will send you a pair of each of the two *Colias*. The difference is about the same as between *Edusa* and *Myrmidone* whose repre-

COLIAS IV.

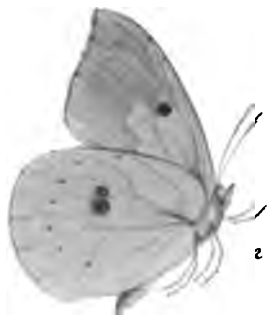
sentatives they are. The males are easy to recognize, but the females approach each other so much, that, in some of my specimens I am puzzled myself, especially when they are not quite fresh."

I have received (December 1868,) a very interesting series of specimens of both *Eurytheme* and *Keewaydin* from Mr. Henry Edwards, of San Francisco, a careful and experienced observer, showing a much wider variation in *Keewaydin* than in the other, both in size and color. Some of the males are very small, scarcely one half the size of the best developed, and they vary in color from deep orange to lemon-yellow. Mr. Edwards writes, "I may notice that the flight of the new species is much more rapid and varied than that of *Eurytheme*—that the only variety which appears in the latter is in the case of the albino female, while the male of the new species is constantly subject to run into the lemon-yellow variety, which however, is rarely so well defined as in the specimen I send you. [Figured in plate.] There appear to be two broods during the year, the insect being most abundant early in the spring, in fact, before *Eurytheme* makes its appearance. It seems to be local and by no means widely distributed. I have chiefly found it at Alameda and along the eastern side of the Bay as far as the San Jose district, but it does not appear in San Mateo County, though *Eurytheme* is very common there. As it is always hovering over plants of *Medicago*, I presume the caterpillar feeds upon that, but nothing is known by me of either larva or chrysalis at present."

From Illinois and vicinity of New Orleans I have received these two species in about equal numbers, but of a large number sent me by Prof. Moore, from Oxford, Miss., all were *Eurytheme*. On the other hand specimens sent by Dr. Lincecum, and taken in Washington Co., Texas, have been nearly or quite all of the other species. Of this collection about one-fourth the females were albino, and the others were quite distinct in size and color from the female of *Eurytheme*. But two females sent from Illinois by Mr. Walsh do very closely approach that of *Eurytheme*, and justify the remark of Dr. Behr. (Fig. 5.)

COLIAS.

V.



From the Museum

From the Collection

EURYDICE 1 2 3 4 5

COLIAS V.

COLIAS EURYDICE. 1—4.

Colias Eurydice, (Eu-ryd'-i-ce) Boisd. Ann. Soc. Ent. France, 1852. *Wosnesenski*, Ménétrée, Catal. Acad. St. Petersburg, 1855. ♀. *Rhodocera Lorquini*, Boisd. Ann. Ent. Soc. France, 1854.

MALE. Expands 2.5 inches.

Upper side of primaries dark fuscous on terminal half and on costal margin; base thickly powdered with black scales and partly covered by long greyish hairs; extra basal space violet pink with an opaline reflection, but changing to deep brownish yellow when viewed obliquely, slightly specked next base and next costa by dark blue scales and cut by black nervures, deeply excavated at extremity of cell, moderately on submedian interspace, and projecting prominently along the upper median interspaces into the fuscous border; three pink streaks on costal edge near apex.

Secondaries deep brownish yellow, clear yellow on costal and abdominal margin; immaculate, fringes roseate.

Under side deep yellow, pale on inner margin of primaries; costal edges pink; edge of hind margin of primaries pink with deep ferruginous marginal points in the interspaces; a submarginal common row of similar points, partly wanting on primaries; two or three such points on costa of primaries and a small patch of ferruginous scales near outer angle of secondaries; at base of secondaries a deep roseate streak on median nervure; discal spot of primaries round, silvered, within a large black ring; of secondaries large, round, silvered, within a broad ferruginous ring, on the anterior edge of which is a second ring enclosing a silver point.

Body above covered with greyish yellow hairs, beneath yellow; legs pink; palpi yellow, pink at extremity; antennæ brownish pink.

FEMALE. Expands 2.3 inches.

Upper side pale greenish yellow, more decided yellow on secondaries; immaculate, except the discal spot on primaries, which is round, pale brown. Under side of primaries yellow, of secondaries pale buff; discal spots on both wings silver in faint pink rings.

LARVA unknown.

Found in California and Oregon.

This lovely species was first made known by Dr. Boisduval who exhibited specimens of it and other Californian butterflies at a meeting of the Ent. Soc. France,

COLIAS V.

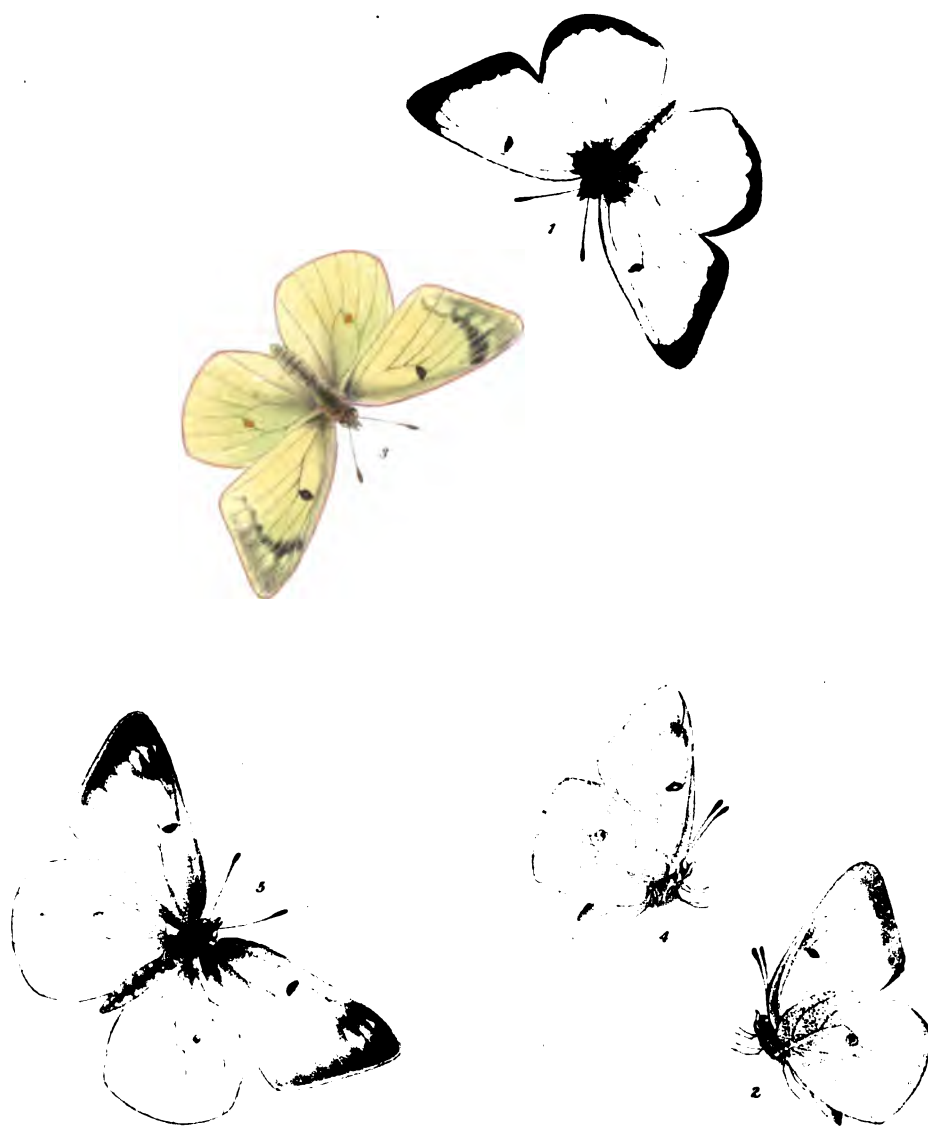
in 1854. The Report mentions, "*C. Eurydice*, the most beautiful of all known Coliades, having the size and form of *Cæsonia*, with much the same design; but in this brilliant species the yellow is replaced by a vivid orange and the fore wings have a violet reflection" and "*Rhodocera Lorquini*, which has nearly the form of our *Rhamni*, with the hind wings a little less angular and a black spot upon the middle of the fore wings."

The *Lorquini* has proved to be the female of *Eurydice*, connecting the genera of *Colias* and *Gonepteryx* (*Rhodocera*) in a remarkable manner.

Mr. Henry Edwards writes me of this species. "This insect is too rare for us to make many observations upon it. It appears to be very local, its chief home being in Marin Co. about 25 or 30 miles from San Francisco. I have also heard of it near Sacramento and have occasionally seen it flying in the streets of this city (San Francisco). It appears in May, the female being sometimes found as late as August. Its flight is very rapid and wild and it is exceedingly difficult to capture. I have seen it alight on the flowers of thistle, but only for a few moments and then away to some considerable distance. The collector who is fortunate enough to secure a good male has indeed a prize. The female is more common and is more readily captured. I have heard of certain years in which this species has been common, so that, like many other butterflies, it may appear periodically in considerable numbers."

COLIAS.

VI.



Drawn by Mary Fent

Bowen & Co Lith Phila

EDWARDS II 12 ♂ 34 ♀ 5 VAR. ♀

COLIAS VI.

COLIAS EDWARDSII, (Behr in lit.). 1—5.

MALE. Expands 2.1 inches.

Upper side bright lemon yellow, color of *Alexandra*; base of wings slightly powdered with black scales; primaries have a narrow, black, marginal band, the inner edge of which is nearly regular, extending a little way on costa, and on inner margin projecting a short attenuated spur; this band cut nearly to the fringe by the yellow nervules; discal spot black, subovate; costal edge and apical part of fringe roseate, at and above inner angle yellow. Secondaries have a narrow marginal band terminating at the lower branch of median, cut by the nervules, nearly regular within, there being only slight projections on the nervules; discal spot wanting; fringe yellow.

Under side of primaries pale yellow, fading towards hind margin and still more on inner margin; discal spot black with a few roseate scales in centre; costal margin slightly covered with black scales. Secondaries much covered with same scales, most densely at base and in middle of disk; ground color very pale yellow; at base of median a small roseate spot; discal spot of medium size, margaritaceous, with rosy scales about its edge; fringes as above; costal edges of both wings roseate.

Body above, lemon yellow, beneath inclining to whitish; palpi whitish; legs pale roseate; antennæ roseate; club brown above, ochrey yellow beneath and at tip.

FEMALE. Expands 2.3 inches.

Upper side same color as male; hind margin of primaries has a broad, incomplete border, represented at inner angle by a few scales only; discal spot as in male, but with a few scales only in centre.

Secondaries have a large, rounded, orange spot on disk, without ring; beneath as in male, except that secondaries are more densely powdered with black, giving a grey shade to the wing; discal spot larger, distinct, edged with roseate; fringe of primaries, above and below, pale roseate, except at the inner angle of primaries; costal edge of secondaries, and both hind and abdominal margins fringed with roseate.

Variety A, ♀ Color much paler; primaries have a narrow border of separated scales edging the whole margin, expanded on costa into a large patch; discal spot of primaries pure black, of secondaries orange; beneath as in the type.

One male, two females, from the collection of Dr. Behr, taken near Virginia City, at high elevations, and named by Dr. Behr in honor of Henry Edwards, Esq., of San Francisco.

This species belongs to the same group as *Alexandra* and *Emilia*.

COLIAS.

VII.



Neonide Maritima

Formica Chalc. Phil.

OCCIDENTALIS. 1. 2. 3. 4. ♀ 5. ♀ Var.

COLIAS VII.

COLIAS OCCIDENTALIS. 1—5.

Colias occidentalis, Seudder. Proc. Bost. Soc. Nat. Hist. 1862.

MALE. Expands 2 inches.

Upper side lemon yellow; primaries have a broad, black marginal border, not cut by the nervules, erose within and nearly straight to the curve, advanced on costa to one-fourth the distance from apex to base, and on inner margin projecting an unusually long, attenuated spur; discal spot con-colored, oval, in a pale black ring. Secondaries have the border broad and nearly even on the inner edge; discal spot large, round, orange; fringes roseate except at inner angle of primaries and outer of secondaries where they are yellow.

Under side deep yellow; costal edge of primaries and basal half of secondaries much irrorated with black; primaries immaculate excepting the discal spot, which is yellow in oval black ring; secondaries have an obsolete sub-marginal series of ferruginous patches, the middle ones only distinct; a ferruginous patch on costa; at base a roseate point; discal spot large, round, silvery with a roseate tinge, within a brown ring that is much specked with roseate scales.

Body above black covered with greenish hairs; below yellow; collar roseate; legs roseate; palpi yellow, roseate on upper side; antennæ dark brown above, paler below; club brown.

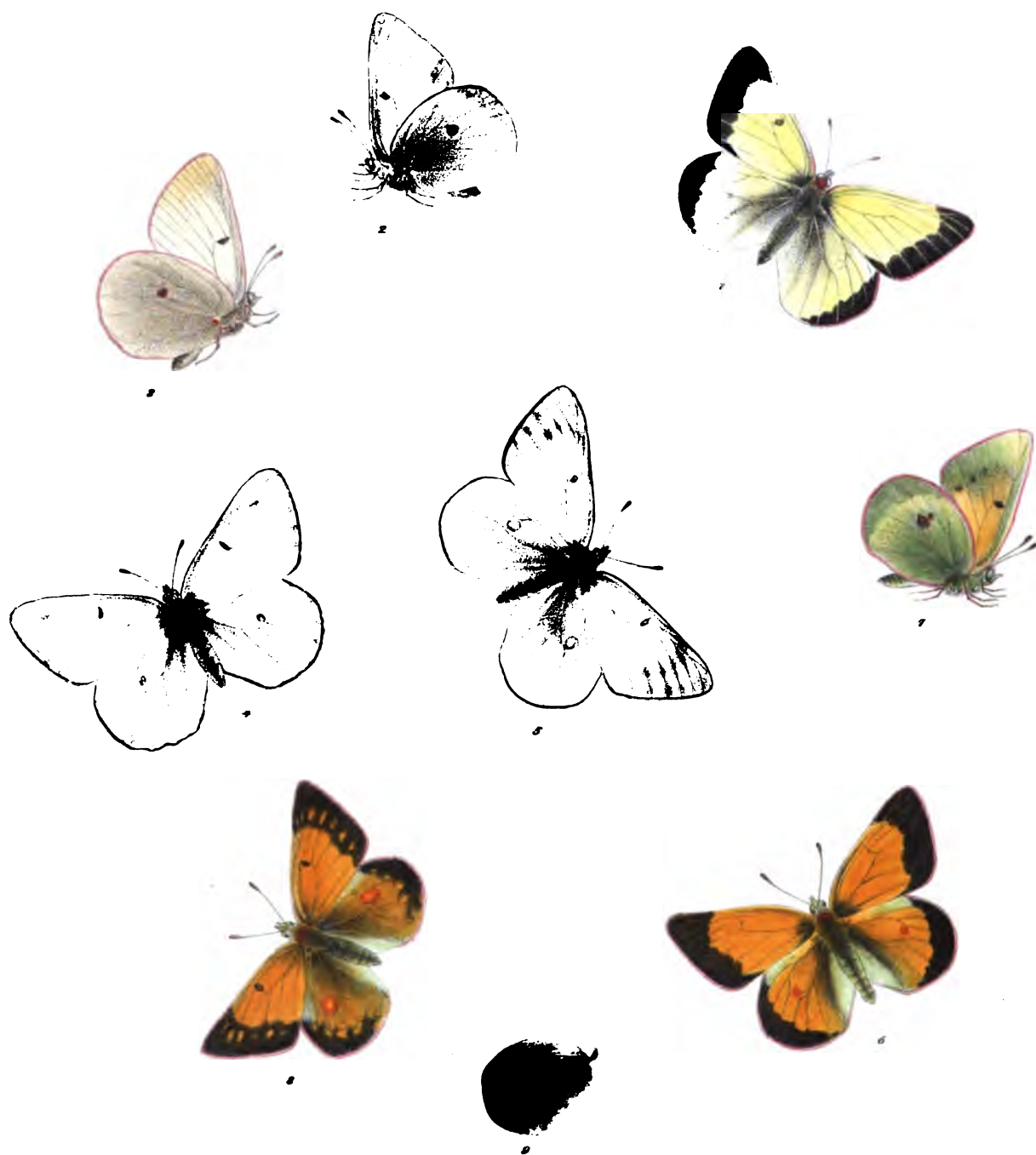
FEMALE. Expands 2.4 inches.

Upper side deeper colored inclining to orange on disk of secondaries; the latter without marginal band; that of primaries broad, faintly marked, consisting merely of patches of grey scales enclosing large yellow spots; discal spot large, sub-ovate, black enclosing a yellow streak; that of secondaries large, round, orange; under side of primaries deep yellow on disk; rest of wing, and all of secondaries pale; discal spots as in male.

FEMALE. Variety A; upper side greenish white; secondaries with a broad border enclosing whitish spots as on primaries.

Taken on Mackenzies River and at the Gulf of Georgia, British Columbia.

COLIAS.
VIII.



Drawn by Mary Peart

L. Bowen, lith. Phila

SCUDDERII, 1, 2, ♂, 3, 4 ♀, 5 ♀, var.
MEADII, 6, 7, ♂, 8 ♀, 9, wing with gland.

COLIAS VIII.

COLIAS SCUDDERII.

Colias Scudderii, Reakirt, Proc. Acad. Nat. Sci. Phil. 1865.

MALE.—Expands 1.8 to 2 inches.

Upper side greenish yellow; marginal borders broad, black, on primaries regularly crenated within, or sometimes, very slightly erose, little advanced on costa projecting a short, attenuated spur on inner margin, and usually cut to the edge by yellow nervules; discal spot of primaries small, black, sub-ovate, of secondaries pale yellow, corresponding in shape to the spot beneath; fringes roseate, yellow at inner angle of primaries and outer angle of secondaries.

Under side dark greenish-yellow, the costa of primaries and whole of secondaries densely irrorated with fine black scales; discal spot of primaries small, black, subovate, with yellow streak, sometimes sub-triangular, a mere line about a yellow spot; of secondaries a silver spot, edged with roseate scales in narrow ferruginous ring, sometimes accompanied by a point of ferruginous, or a large spot with silver pupil; sometimes also a stout ray of ferruginous projects from the large spot towards hind margin; on costal edge of secondaries a few ferruginous scales and a bright pink spot at base; otherwise immaculate.

Body above covered with yellow and grey hairs, beneath concolored; collar roseate, legs roseate; palpi yellow, grey in front; antennæ roseate; club brown above, roseate below.

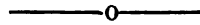
FEMALE.—Same size.

Upper side pale yellow, much irrorated with black along costal margin and apex and hind margin of primaries, but showing no regular band or spot; discal spots as in male; under side still more densely irrorated except along hind margin of secondaries, the disk having a greyish-yellow shade.

Var. A.—FEMALE.—Color pale greenish-white; the margin of primaries much irrorated at tips of nervules, and sometimes, small patches of scales at origin of sub-costal nervules; under side white at base and on inner margin of primaries, yellow at apex and over whole of secondaries, this yellow space always densely irrorated. In both sexes there is much variation in size of dorsal spots on under side.

COLIAS VIII.

Taken in abundance by Mr. Mead, in Colorado, in the upper Arkansas Valley and in the vicinity of Twin Lakes, during July 1871. The species seems to replace *C. Alexandra*, which is more peculiar to the Platte Valley, although individuals of both species are to be found in either district. Four-fifths of the females of *Scudderii*, taken were albinos, while with *Alexandra* the albinos were exceedingly rare. The latter species was first observed by Mr. Mead on the 15th of June, near the South Park, at an elevation of about 9000 feet, and a few days later it was abundant at Turkey Creek Junction. Many eggs were obtained, deposited on a dwarf species of *Lupinus*. A young larva was also found. It was three-fourths inch in length, clear green, with a double, yellow-white dorsal stripe and a single lateral stripe of similar color, each stripe enclosing a broken roseate line.



COLIAS MEADII.

Colias Meadii, Edwards, Trans. Am. Ent. Soc. 1871.

Secondaries presenting a large sub-ovate, ochraceous, glandular space at base of subcostal nervure, as in *Edusa*.

MALE.—Expands 1.7 inch.

Upper side fiery orange, of uniform shade quite to the marginal border and with an opaline reflection; bases of wings densely irrorated with black; abdominal margin of secondaries green and yellow similarly irrorated; the border of primaries very broad, black, erose within, not much advanced on costa and projecting but a short spur on inner margin; that of secondaries nearly as broad, covering the whole margin; discal spot of primaries merely indicated by a few black scales on a deeper orange ground; of secondaries deep orange; fringes roseate mixed with yellow.

Under side of primaries yellow-green on costal and hind margins, buff on disk; the anterior part of the wing much specked with black; discal spot yellow in black oval; secondaries yellow-green, though varying in depth of color in individuals, and much obscured by black scales; discal spot silvery in a large ferruginous patch, sometimes accompanied by a second small spot; a roseate spot at base; otherwise immaculate.

Body above black; collar roseate, thorax and abdomen green; legs pale roseate; palpi green, roseate in front and at tip; antennæ roseate; club brown tipped with fulvous.

FEMALE.—Expands 1.9 inch.

Primaries orange, sometimes as bright as in the male, but often duller colored;

COLIAS VIII.

secondaries much irrorated with black, giving the whole wing a dull orange-grey shade; within the marginal borders a complete series of small yellow spots, not wholly enclosed on secondaries; discal spot of primaries an orange streak in small black oval; on the under side the green is of a bluish, often greyish tint.

Taken in Colorado by Mr. T. L. Mead, in the month of July, 1871. Mr. Mead wrote from Twin Lakes, on 12th July, "On 8th, we left Fairplay in an open hack which carries the weekly mail for this section. The driver was a Yankee boy who obligingly delayed altogether more than an hour for me to catch specimens on the "divide." This is the water-shed between the Platte and Arkansas valleys. Probably the pass is very nearly 12,000 feet above the sea. Above 11,000 feet an elegant species of *Colias* makes its appearance. It is fiery orange and the female also is very bright. I secured 12 specimens." From Fairplay, 24th July, "Last Saturday we rode out to Mt. Lincoln and made the ascent. I took 34 specimens of the fiery *Colias*." He also took a single specimen at Kenosha House, a few days later. The species frequents the highest peaks and ranges, and none were obtained at a lower level than 10,000 feet above the sea.

This *Colias* bears close resemblance to *Hecla*, but may be readily distinguished by the glandular spot before spoken of (see Plate), a character not found in *Hecla*, and so decisive that it is not necessary to point out minor points of difference.

ARGYNNIS.

I.



Drawn by D. Wiest.

DIANA 12. ♀ 3 4 ♂.

Bowen & Co. lith. & col. Philad.

ARGYNNIS.

I.



Drawn by Mary East

DIANA 12.2348

Revised 10-11-1907

ARGYNNIS I.

ARGYNNIS DIANA. 1—4.

Argynnis Diana. ♂. Cramer, II. 4, pl. 98. Fab., Ent. Syst. III. 447. Say, Am. Ent. I. pl. 17. Boisduval and LeConte, p. 149. ♀. Edwards, Proc. Ent. Soc. Phil. iii, p. 431. (1864.)

MALE. Expands 3.3 inches.

Upper side, from the base to beyond middle of wings, dark velvet-brown; the outer limb deep orange, forming a wide band, crenate within on primaries and cut by the brown shade along the nervures almost to the margin; both wings edged by a brown line, which is preceded by a second, somewhat indistinct, but conspicuous at the crossing of the nervures, especially on primaries, where, at each crossing, is a patch of brown scales; upon the orange band a double row of rounded brown spots, the outer one partly obsolete, the inner distinct and having the three lower spots much larger than the others.

Under side of primaries, next base, black, edged without by a zig-zag line similar to that of Cybele and allied species, the interspaces next within this line of the color of the margin; transverse patches of same color in the cell; next the arc an irregular silver bar; on the costa a few silver scales; outer limb orange-brown; the three largest spots of sub-marginal row reappear faintly.

Secondaries have a silky gloss; the basal two-thirds a dead-leaf brown; outer limb same as on primaries, immaculate; edging the brown space is an interrupted black line, more or less covered by silver scales and terminating, on each margin, in a triangular silver spot; between the costal and sub-costal a silver crescent, edged anteriorly by black; at the junction of same nervures a few silver scales; on the arc an indistinct eyelet of darker brown; within the margin a continuous band of elongated silver crescents.

Body above velvet brown, beneath same as secondaries; legs and palpi same color; antennæ dark brown above, ferruginous below; club dark brown tipped with ferruginous.

FEMALE. Expands nearly four inches.

Upper side black, with blue or green reflections. Primaries have three transverse rows or spots; the marginal small, rounded, white or bluish-white; the sub-marginal elongated, rectangular, wanting two spots next the costa, bluish-white; the median of irregular blue patches; a blue patch on the costa; the two lower spots of the submarginal and median united.

Secondaries have a marginal row of bluish white bars between and reaching to the nervures, the three or four hinder ones broadest and bisected by a black line; a broad submarginal metallic blue band, divided by the nervures into oblong

ARGYNNIS I.

spots, each of which, except the two extreme, enclosing a rounded black spot near its anterior edge. Fringes of both wings white, black at ends of nervures.

Under side of primaries black, with a slight blue reflection; apical border brown; on the apex a white patch edged within by silver; a marginal row of white crescents, nearly obsolete above, the lower ones preceded by a grey shadow and streak; a median row of whitish spots corresponding to those of upper surface; a large white patch on costa; anterior to the median a row of spots, of which the lower is purple, the upper one green, much elongated; in the cell three green spots, that next the arc slightly silvered; between the other two a faint brown patch; silver scales on the costa.

Secondaries have the basal two-thirds brown, varying in shade in different specimens, from blackish to dark red, and usually with a greenish-grey reflection; this space edged without by a silvery line more or less complete, (but sometimes wholly wanting,) which terminates on the margins in triangular silver spots; the silver crescent as in the male; eyelet on the arc often silvered; outer limb blackish-brown, with green reflections; hind margin edged by a narrow grey band, which is preceded by silver crescents as in the male.

Body black above, red brown below, legs and palpi red brown; antennæ as in the male, but a shade darker.

Specimens vary much, some having the spots of upper surface green instead of blue; the variation in silvering below is extreme, from almost nothing to complete ornamentation.

The larva is unknown.

Until quite recently this butterfly has been almost unknown in Collections. Boisduval and LeConte say that they never saw it, and that their description, as well as that of Godart, and probably of Fabricius, were taken from the figure of Cramer. This figure of Cramer's is much better than that of Say, which must have been made from a worn-out specimen, as his description also indicates. Say says he had taken the species in Georgia, Florida, Arkansas and Missouri. No mention is made of the female by any author, and it seems to have been unknown till its discovery by me in 1864, in Kanawha County, West Virginia. On the 20th August I saw, for the first time, a male, hovering about the flowers of the Iron-weed (*Vernonia fasciculata*), and succeeded in taking it. Two days afterwards, in same vicinity, while breaking my way through a dense thicket of same weed, hoping to find another Diana, I came suddenly upon a large black and blue butterfly feeding so quietly as to allow me to stand near it some seconds and watch its motions. It seemed to be a new species of *Limenitis*, allied to *Ursula*, which it resembled in color. But on taking it, I saw it was a female *Argynnis*, and the general pattern of the under wing left little doubt of its affinity to *Diana* male, despite its total difference in color and of upper surface. Subsequent captures con-

ARGYNNIS I.

firmed this conjecture, and out of the large number that have since been taken the males have been of the known type and the females black, with no tendency in either to vary in the direction of the other.

When my attention was called to the species, I found it not very uncommon, always upon or near the Iron weed, which is very abundant and grows in rank luxuriance upon the rich bottom lands of the Kanawha river, frequently reaching a height of eight to ten feet, and, in August, covered by heads of purple flowers that possess a remarkable attraction for most butterflies. Both sexes are conspicuous, the males from the strong contrast of color, and the females from their great size and the habit of alighting on the topmost flowers and resting with wings erect and motionless. It is an exceedingly alert and wary species, differing in this from our other Argynnides. At the slightest alarm it will fly high into the woods, near which, upon the narrow bottoms or river slopes it is invariably found. It is a true southern species, sensitive to cold, not to be looked for in the cooler part of the morning, but flying down from the forest when the sun is well up. From eleven to three o'clock is its feeding time.

Altogether, nearly 50 of both sexes were taken in 1864, between the 20th and 30th August, the males all worn and corresponding with Say's figure, the females in large proportion fresh from chrysalis. In 1865 nearly one hundred were taken in same locality with like results. In the two years following they were extremely rare. On the 4th July, 1867, a perfect male, very different in shades of color from the poor specimens hitherto seen, was taken, and two others were seen shortly after, but in the absence of flowering plants it was impossible to approach these last.

In July, 1866, Mr. James Ridings, while on an entomological excursion in Georgia, captured three perfect males near Atlanta, from one of which our figure was drawn. These were all by the road side in the sandy, flowerless pine forest, and had alighted on logs or tree trunks. No females were seen by Mr. Ridings.

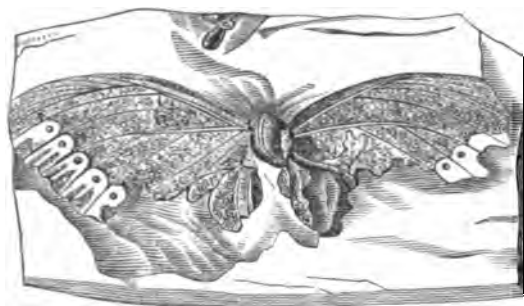
We may be sure, therefore, that the males emerge early in July and are in flight till last of August, and the females from early in August till last of September. And that the range of the species is from Georgia to the lower part of West Virginia, but how far west we have no knowledge, except from Say's mention of Arkansas and Missouri. It probably may be found along New River (as the upper part of the Kanawha is called) which flows from the mountains of North Carolina, and offers a channel by which many southern species of butterflies, and insects of other orders, find their way to the warm valley of the Kanawha.

The contrast between the sexes in the present species has no parallel among North American butterflies. In the instance of *Papilio Turnus* there are females of two colors, one of which resembles the male in color and markings, and the other (*Glaucus*), while differing in color, retains the markings. And in *Turnus* there are many cases where the two colors are mingled in the same individual, giving them a

ARGYNNIS I.

brown or a mottled appearance. I have a curious example of this last, taken on the Kanawha, where the whole surface is mottled, sometimes yellow prevailing, sometimes black. But in Diana the sexes are absolutely separated in color, and, on the upper surface, as widely separated in markings. On part of the lower surface there is a resemblance, but any other two species of *Argynnis* that may be selected are nearer each other than are the two sexes of Diana.

In the Sixth Edition of Lyell's *Elements of Geology*, figure 179, is represented a fossil butterfly (reproduced below) from the miocene beds of Croatia, taken from Heer's *Insektenfauna der Tertiäre, &c.*, which bears a singular resemblance to Diana male. It is called *Vanessa Pluto* in the text, but is plainly an *Argynnis*. Even the colors of the insect were partially preserved. Heer himself calls attention to the resemblance to Diana, though he inclines to think it still more resembles *Vanessa Hedonia*, Cramer, an Indian species. He says, "among butterflies of a similar



coloration may be mentioned *A. Diana*, Cramer. This butterfly is black (dark brown?) and is furnished on the outer border with a row of yellow spots divided by the nervures. These yellow spots reach to the border and each one has two black dots. Diana is decidedly larger. In size and coloration the fossil agrees better with *Hedonia*, yet this point cannot be decided

with certainty until a specimen is found with the outer border completely preserved." With the *Pluto* are found Dragon-flies "with speckled wings, like those of the Southern States of North America." Lyell, page 245. And on page 256, "the insect fauna of the age of the beds of Oeningen, (miocene,) like the plants, are of a recent American type."

Variations in size are of little moment in comparing species, as every species furnishes individuals both much larger and much smaller than the average. Form and markings are essential, and coloration in a less degree. In the present case, taken in connection with the character of the fauna, I am apt to believe that our superb Diana comes of a venerable antiquity, and is entitled to rank as the head of this large and beautiful family.

ARGYNNIS.

II.



Argynnis cybele

Argynnis cybele

CYBELE 12 ♀ 3. 4. 5.

ARGYNNIS II.

ARGYNNIS CYBELE. 1—4.

Argynnis Cybele (Cyb'-e-le), Fabricius, Ent. Syst. III, 445. Godart, Enc. Meth. IX. 263. Boisduval and LeConte, 151. *Daphnis*? Cramer, plate 57.

Primaries broad, strongly arched, slightly concave on hind margin.

MALE. Expands 3 inches.

Upper side fulvous, inclining to luteous, brown at base; whole surface marked and spotted with black; primaries edged by a narrow line, preceded by a second, heavier and parallel, upon which rests a series of connected lunules, each enclosing a rounded fulvous spot; the clear fulvous space between the lines cut into spots by the black nervules; beyond the lunules a row of large round spots, a bar on costa, and a heavy zig-zag median band; outside the cell a spot shaped like the letter P inverted, inclosing a fulvous space; three sinuous bars across the cell.

Secondaries have the submarginal line only, and a series of detached unconnected crescents; a row of small rounded spots and a median band of irregular spots, crescent or rectangular, almost obsolete on the abdominal margin but expanding largely near costa in the direction of the base; on the arc a spot like the letter S; nervures black only from the submarginal line to edge; fringes yellowish at the emarginations, black at tips of nervules.

Under side of primaries pale yellowish-brown, the apical space yellowish and enclosing a bright brown patch on costal margin; the hind margin has a broad border of same color, except at the extremities, where it is yellowish; resting on the border next inner angle are three lanceolate black spots, beyond these, to apex, five others, brown; all enclosing yellowish spaces, those next apex slightly, if at all, sprinkled with silver scales; on the patch are three silver spots; the black markings of upper surface repeated.

Secondaries have the basal two-thirds red-brown, more or less mottled with yellow; hind margin brown, fading into yellow near anal angle; the space between the two outer rows of silver spots bright yellow and immaculate, making a conspicuous band, characteristic of the species; the silver spots are twenty-four or twenty-five in number, viz: seven large dentate upon the border, all edged above with brown; a second row of eight irregular, the eighth, a stripe on the margin, often wanting; a third row of five or six, the first lunulate, the second minute, the third minute, often wanting, the fourth pyriform, cut by the arc, the fifth and sixth streaks; next two round spots in the cell, a third below the median and two at the junction of the nervures above; the shoulder broadly silvered; abdominal margin lightly; all these spots, except the marginal row, the last on third row and the two

ARGYNNIS II.

next base, are edged with black above; the three round spots near base circled with black.

Body above color of base, below light buff; legs and palpi still lighter; antennæ fulvous above, ferruginous below; club black, ferruginous at tip.

FEMALE. Expands 3.5 inches.

Luteous; the base more obscure, often almost black, spots and lines heavier.

Under side duller colored; the band on secondaries broad and immaculate.

The two species, Cybele and Aphrodite, have generally been confounded by authors and collectors. Boisduval and LeConte say, "it appears to us without doubt that P. Aphrodite of Fabricius is the same as his Cybele, only we believe that he has described the male from nature under the name of Aphrodite, and the female under the name of Cybele from the figure of Cramer." The figure in Boisduval and LeConte is that of Cybele female.

The Daphnis of Cramer represents neither Cybele nor Aphrodite. The fore wings are too narrow and pointed for either. The color and markings of upper surface are nearest Aphrodite; the under side of hind wings is also nearest Aphrodite in the basal color, but it has the immaculate yellow band of Cybele.

Godart says "Cybele has the outer row of silver spots separated from the next by a *pale transverse sinuous band, broad in the female, very narrow in the male*;" of Aphrodite, "that it has a yellow band posteriorly," thus confusing the two species and the sexes of one; inasmuch as Cybele in both sexes has a broad yellow band, and Aphrodite a narrow one, usually so encroached on by the basal color as not improperly to be called a "sinuous" band, but if anything, broad in the male, narrow in the female. Godart adds, "we find it (Aphrodite) very similar to Cybele."

In Harris' Insects of Mass. 2d ed. 1862, Aphrodite is described as being "tawny yellow in the males, ochre yellow in the females," which applies pretty well to Cybele, but not at all to Aphrodite. The figure given is Aphrodite female. Cybele is not mentioned by Dr. Harris as found in New England.

In Westwood and Humphrey's British Butterflies is a general description and a figure of what is called an Aphrodite, an American insect, on one occasion taken in England. It is certainly not to be recognised as Aphrodite or any other American species. The text says, "there are several very closely allied American species including the present, if indeed they are not merely varieties of each other."

Kirby (Fauna Bor.) describes Aphrodite at length, and his description is copied in Morris, (Syn. Lep. N. Am.) He gives Aphrodite as synonymous with Cybele. I have followed this description carefully, with specimens of both in hand, and am unable to determine which he describes. He says, "primary wings '*tawny orange*'—at the posterior margin is a *deep orange band* edged with black;"

ARGYNNIS II.

"beneath, at the external angle are five silver marginal triangles *surmounted with black*;" secondaries underneath "have a pale *tawny marginal band*, a marginal series of seven triangular spots *edged with black*." None of these characters belong to Aphrodite, and unless it be the color—"tawny orange" "and the tawny marginal band"—none belong to Cybele.

Mr. A. R. Grote, who spent several months the past year (1867) in examining the principal entomological collections of Europe, informs me that in none of them are these two species separated, sometimes being labeled by one name, sometimes by the other.

The description of Cybele by Fabricius is as follows:—

"*Alis dentatis fulvis nigro maculatis: subtus maculis 34 argenteis.*

Pupilio Daphnis. Cram. Ins. 5, tab. 57, fig. E. F.

Habitat in America.

Statura praecedentium [i. e. *Aglaia*, *Aphrodite*, &c.]. *Alae omnes dentatae, luteae, nigro maculatae. Subtus puncta octo in alis anticis et 26 in posticis argentea. Fascia flava in alis posticis ante marginem.*"

This description is correct in the essential particulars, *color luteous*, secondaries with a *yellow band*. The exact number of silver spots is immaterial, as in both species they vary.

The description of Aphrodite is as follows:—

"*Alis dentatis fulvis nigro maculatis: posticis subtus fuscis: maculis 24 argenteis.*

Habitat in America meridionali.

Medius. Antennae ferrugineae clava nigra, apice ferruginea. Alae supra fulvae, nigro maculatae. Subtus anticae fulvae, nigro maculatae punctisque quatuor apicis argenteis. Posticae fuscae fascia apicis flavescens maculisque 24 argenteis."

Color *fulvous*; fore wing *beneath fulvous*; hind wings *beneath fuscous*, that is, black and red.

This description applies particularly to Aphrodite female.

I therefore present, for the first time, descriptions and figures of the males and females of both species. Cybele is the larger, and the difference in color between the sexes is much less than in Aphrodite. In the latter the male is much smaller in proportion to the female, is brighter colored than Cybele, and has very little brown at base of wings. The black markings are noticeably more delicate, the marginal lines on primaries nearer together, more or less excluding the fulvous spots which, in Cybele, are distinct along the whole margin. The margin of secondaries also has an edge line like the primaries; the median band is formed of small crescents, separated by wide spaces and obsolete on costal margin; and there is no black space between the costal and subcostal as in Cybele. On the under side the silver marginal and costal spots are decided, while in Cybele they are usually wanting, or indicated by a few scales only; the basal color of secondaries is cinnamon-brown, and the band is more or less encroached on by the ground color; the pyriform spot of third row is cut by the arc as in Cybele, but the smaller

ARGYNNIS II.

spot thus made is edged above with black and is in effect a distinct spot. Comparing the females, Cybele is luteous, very dark at base, heavily marked with black. Aphrodite is suffused with a rich red tint that seems as if in the very texture of the wing, and that makes living specimens conspicuous; the under side of primaries is red fulvous, of secondaries deep ferruginous, and the band is almost wholly crowded out. I have taken scores of individuals of both species, in many localities and for many seasons, and there is no mistaking either at first glance.

Cybele is found in the lowlands of New York, and in New Jersey, Pennsylvania and Virginia and westward to Illinois. How much farther south I am unable to say, but have not received it in collections from Georgia, Florida or Louisiana, nor from beyond the Mississippi River. In West Virginia, on the Kanawha River, it is abundant in June and September, frequenting gardens and clover fields in June, and later, the Iron weed, in company with innumerable Papilios, Vanessas and Hesperians, and occasionally an Aphrodite or Diana.

Of the larvæ nothing is known, as is unfortunately the case with the larvæ of a large proportion of our butterflies. Probably, like the European species of this family, it feeds upon the wild violet.

ARGYNNIS.
III.



Drawn by D. West.

Brown & Co. lith. & col. Philad^a.

APHRODITE 12 & 3 4 & 9.

ARGYNNIS III.

ARGYNNIS APHRODITE. 1—4.

Argynnis Aphrodite (Aph-ro-di-te), Fabricius, Ent. Syst. III, 443. *Cybele*? Godart, Ent. Meth. IX, 264. Kirby, Faun. Bor. IV, 290. Harris, Ins. Mass. 1862, 285.

Primaries broad, strongly arched, slightly concave on hind margin.

MALE. Expands 2 to 2.2 inches.

Upper side bright red fulvous, slightly obscure at base, marked and spotted with black; primaries edged by a double marginal line, enclosing between the nervules fulvous streaks next inner angle and points at apex; other markings as in *Cybele*, but more delicate.

Secondaries have also a double marginal line more separated than on primaries and enclosing a clear fulvous space, the submarginal at the intersections expanding into spots that extend a little distance upon the nervule; the marginal crescents as in *Cybele*, but reduced; the rounded spots minute; the median row consists of small, widely separated crescents; the mark on the ark like the letter S; fringes buff at the emarginations, black at tips of nervules.

Under side of primaries reddish next base and on inner margin, buff towards apex, with brown apical patch and hind margin; on the patch two or three silver spots; the border edged by lanceolate spots, the lower two black, the other six brown, enclosing silver spaces.

Secondaries have the basal two-thirds cinnamon brown, which color so encroaches on the buff space that is between the two outer rows of silver spots, especially at the extremities, that it does not present a pure band, as in *Cybele*; hind margin same brown as on primaries; on this rests a series of seven silver spots, the two next apex nearly oval, the rest dentate; the second row consists of seven elongate or pyriform; the third of six, the first crescent, second minute, third often wanting, fourth pyriform, cut by the arc into two, the lower as well as the upper edged above with black; fifth crescent, sixth minute; within the cell one, sometimes two round spots; an oval below the median and two patches at base; all edged with black above, except the outer row, which is edged with brown, and the two basal patches; shoulder and abdominal margin heavily silvered.

Body above color of base, beneath buff, legs and palpi brown; antennæ fulvous above, pale below; club black ferruginous at tip.

FEMALE. Expands 2.6 inches.

Less fulvous than the male, the outer limb inclining to luteous; suffused on the basal half with a fiery tint, very noticeable in fresh specimens; hind margin of primaries has a heavy black border enclosing fulvous streaks and points; base

ARGYNNIS III.

and inner margin reddish; secondaries beneath nearly covered with dense ferruginous almost obliterating the band.

This species has usually been confounded with *Cybele*. For a full comparison of the two see the preceding paper.

Aphrodite is common throughout the southern and less elevated parts of New England and of Canada, but also of the mountainous parts of southern New York and of Pennsylvania, and is occasionally found in West Virginia and as far west as Illinois. Mr. Scudder, in his List of Butterflies of New England, says it is not found among the White Mountains, where it is replaced by *Atlantis*. In the Catskill Mountains, of New York, it is a very common species, but not to the exclusion of *Atlantis*, which also is tolerably abundant. The males are first seen in that region from the 1st to 10th of July and the females about the 15th, flying through the open woods and upon the still uncut meadows. In the sunlight the red tint, especially of the females, is intense. Something of this is lost in cabinet specimens, but it is always sufficiently preserved to show a strong contrast to *Cybele*. In the Northern States *Aphrodite* produces but a single brood. In West Virginia, upon the Kanawha River, there are two, in June and September. These southern specimens are less brightly colored. I have never seen the larvæ, but am informed by Mr. D. W. Beadle, of St. Catherines, Canada, that "they feed upon all kinds of wild violet, that they feed at night, but lie concealed during the day beneath chips or stones on the ground. In appearance they much resemble the larvæ of *V. Antiopa*, and are found early in July."

ARGYNNIS.

IV.



Drawn by D. West.

From the collection of the British Museum.

NOKOMIS ♂.

ARGYNNIS IV.

ARGYNNIS NOKOMIS.

Argynnis Nokomis (No-ko'-mis), Edwards, Proc. Acad. Nat. Sci. Phil. 1862.

Primaries broad, strongly arched, slightly concave on hind margin.

MALE. Expands 3.3 inches.

Upper side uniform bright fulvous, very little dusky next base, resembling in these respects *Aphrodite*: hind margins edged by a fine black line which is preceded by a heavy parallel line, the nervures between being black; both wings inscribed and spotted with black, much as in *Aphrodite*; the fulvous space on the limb of both wings is notably broader than in that species or in *Cybele*; the submarginal spots on primaries are serrate, except at apex, where they are lunular; on secondaries they are lunular, separated, and do not touch the submarginal line; the median band of secondaries is formed of separate crescents, the hinder ones heavy and much curved; the spot on the arc shaped like the letter S and very heavy.

Under side: base and inner margin of primaries bright red fulvous; towards apex buff, without a brown patch; on the margin six silver triangles next apex, each surmounted with black; three silver apical spots, the anterior one minute.

Secondaries cinnamon brown, a little mottled with buff and slightly tinged with green next abdominal margin; between the two outer rows of silver spots a broad, immaculate, bright buff belt; hind margin yellowish brown; the silver spots are twenty-one in number, viz., seven elongated on margin, edged both above and below with black; a second row of eight, the first three and fifth and sixth from costa large, rounded or pyriform, the fourth minute, the seventh lanceolate, the eighth minute, edged below with black, the others edged heavily above with black, and projecting a shadow on the belt; a third row of three large, irregular patches, heavily edged above with black; a black point between the first and second, and a black oval ring on the arc; a round spot circled with black in the cell, an oval below the median, a silver stripe at base of upper nervure; costa at base and abdominal margin lightly silvered.

Body above dusky fulvous; below light red brown; antennæ long; club massive, dark brown, tipped with fulvous.

From one specimen taken among the Bitter Root Mountains, Montana.

The female is unknown, and I am not aware that any other specimen of the male has been taken than the one above described. This is the largest of the

ARGYNNIS IV.

Pacific species thus far discovered, and exceeds in expanse of wings any male Cybele I have seen.

Mr. Felder, in his "Neues Lepidopteron aus der Familie der Nymphaliden," has divided the genus *Argynnis*, enumerating the smaller and some of the larger species under the head of *Brenthis*. It is sufficient to show the artificial character of this genus that *Nokomis* and *Astarte* (Doubleday) are placed by the side of *Bel-lona* and *Myrina*, as separated from *Cybele*, *Aphrodite* and other species. Doubleday in his "Genera" divides *Argynnis* into two groups upon structural differences so slight that he did not consider them sufficient for the foundation of separate genera. It does not seem to me possible to subdivide so compact a genus as this without violence, and I cannot but look upon the creation of genera founded upon artificial distinctions as a hindrance and not an aid to the study of Natural History.

ARGYNNIS.
IV.



Drawn by Mary Peart.

L. Bowen, lith. Phila.

NOKOMIS, 1, 2 ♂, 3, 4 ♀.

ARGYNNIS IV.

ARGYNNIS NOKOMIS.

Argynnis Nokomis (No-ko'-mis), Edwards, Proc. Acad. Nat. Sci. Phil. 1862.

Primaries broad, strongly arched, slightly concave on hind margin.

MALE.—Expands 3.4 inches.

Upper side uniform fiery fulvous, very little dusky at base; hind margins edged by two parallel black lines, the outer one delicate, the other heavy, the fulvous spaces between cut into spots by the black nervules; both wings inscribed and spotted with black, more coarsely than in *Aphrodite*; the rounded spots small; the clear fulvous extra discal space notably broad; the submarginal spots on primaries lunular at apex, otherwise serrate; on secondaries lunular, separated from each other and from the marginal lines; the mesial band of secondaries formed of separate crescents; the spot on arc like the letter S.

Under side of primaries bright red at base and on disk, changing to fulvous on outer limb and quite to hind margin; apical portion golden yellow, the anterior six submarginal spots well silvered; four silvered subapical spots, the upper two minute, each on an olivaceous ground, posteriorly edged by black scales.

Secondaries uniform golden yellow from base to margin; the silver spots conspicuous, the outer row entirely surrounded by black, and all the others heavily edged anteriorly by black; the seven spots of outer row narrow, elongated except the two at outer angle, which are broad and rounded; of the eight spots of second row, the first three from costa and fifth and sixth rounded, the fourth small, seventh lanceolate, the eighth a dash on the margin; the third row of three, large and irregular; in cell a round spot in black ring, an oval below, and two spots without edging at origin of upper nervures; costa and abdominal margin lightly silvered.

Body above fulvous, below buff slightly tinted with fulvous; legs buff; palpi buff, deep fulvous at tip; antennæ dark brown above, fulvous below; club brown tipped with fulvous.

FEMALE.—Expands 3.6 inches.

Upper side dark chocolate brown, the black markings indistinctly shown; the disks spotted with bright yellow, which takes the form of a common band of spots separated by the black nervules, and very much resembling in shape and distribution the blue spots on *Diana* female, enclosing in same way as in that species the rounded extra discal black spots; these elongated spots are sometimes tinted slightly with fulvous, especially on primaries, and are much and irregularly irrorated with

ARGYNNIS IV.

black scales; the submarginal lunules are yellow and the spaces between the marginal lines partially so, giving the effect of a double row of marginal spots on secondaries; in the cell of primaries two transverse yellow stripes and nearer base a stripe composed of greenish scales; under side similar to male except that the yellow is more decided and not golden and the margins of both wings as well as the apical portion of primaries much irrorated with black; the subapical silver spots are also on a black ground; secondaries have the basal portion much obscured by a greenish-brown tint, and much irrorated with black, the belt between the two outer rows of silver spots being clear yellow and immaculate.

From 5 ♂, 2 ♀, brought from Arizona by the Exploring Expedition under Lieut. Wheeler, in 1871, but with no further intimation of their locality. The original specimen from which the description of the species was drawn was received by me in 1862, through the Smithsonian, and was labelled "Bitter Root Mountains." Until the present year (1872) it has been an unique in my collection and, so far as I know, not found in any other. But the species is so superb an one that I have not hesitated to redraw the plate. It is allied to *Leto* in many respects, in the general appearance of the upper side of the male, and in the colors of the female. But in the shape of the spots the female bears a curious resemblance to *Diana*. I regret that I am able to add nothing of its history.

ARGYNNIS.

V.



ATLANTIS. 12 ♂ 3 ♀

Reverend Mr. G. C. Davis, F.R.S.

ARGYNNIS V.

ARGYNNIS ATLANTIS. 1—3.

Argynnis Atlantis. Edwards, Proc. Acad. Nat. Sci. Phil., 1862.

Primaries long and narrow, moderately arched; hind margin slightly convex.

MALE. Expands from 1.75 to 2.25 inches.

Upper side fulvous, obscure at base; both wings have broad black hind margins which enclose more or less fulvous between the nervules of secondaries, and at inner angle of primaries; the marginal spots either lunular or serrate, often confluent on secondaries as on primaries, and resting on the border; the spots of median row on secondaries narrow and confluent, forming an angular band, in this respect differing from the other Atlantic species; the other markings as in *Aphrodite*; fringes yellowish, black at tips of nervules.

Under side of primaries reddish, costa and apex light buff with brown apical patch and hind margin; upon the patch two silver spots; on the margin eight serrate spots, the upper six brown enclosing silver triangles, the two lower black.

Secondaries dark red brown, much mottled with greenish grey or with drab; the band between the two outer row of spots pale yellow, usually pure from margin to margin; upon the border a series of seven triangular silver spots edged below with black and above by a few black scales preceded by brown lunules; the second row consists of seven rounded or oval spots, each projecting a brown shadow upon the band; the third row of six spots, of which the fourth is cut into two by the arc and the smaller spot edged above with black; two round spots in the cell, a third, long oval at origin of median and two at base of upper nervures; all except the last edged above with black; the round spots and oval wholly; shoulder and abdominal margin broadly silvered.

Body above color of base of wings; beneath, abdomen yellowish, thorax grey; palpi reddish grey; antennæ fulvous; club black, tipped with ferruginous.

FEMALE. Expands from 2.25 to 2.75 inches.

Color inclining to luteous; the black margins very heavy.

Atlantis is readily distinguished from *Aphrodite* by its smaller size, duller color, broad black margins, confluent median band of secondaries and color of same wings below; also by the longer and narrower fore wings. It is found in the mountainous districts of New York and in British America at least as far north as Rupert's House, Hudson's Bay, and Lake Winnipeg. Among the Catskill mountains of New York it is not uncommon in certain localities, such as narrow passes through the mountains and in the grass fields, which in those places often

ARGYNNIS V.

skirt the forest. But it is rarely to be seen in the open country, where *Aphrodite* abounds. The males appear, in the Catskills, early in June, two or three weeks before *Aphrodite*. They may be seen in company with *Limenitis Arthemis* and *L. Proserpina*, alighted in small clusters among the damp leaves by the road side or upon offal of any description. All these species are attracted by any decaying animal matter, and a piece of meat or a dead bird or snake has irresistible charms for them. Mr. Scudder, in the *List of Butterflies of New England*, mentions that *Atlantis* is common in the valleys about the White Mountains the last of July and early in August, which is a month and more later than they appear in the Catskills. The northern specimens are diminutive in size. According to Mr. Scudder, *Aphrodite* is not found among the White Mountains. The three species, *Atlantis*, *Aphrodite* and *Cybele* occupy severally northern, middle and southern belts of the Atlantic slope. Of the other two large Atlantic species, *Diana* strictly belongs to a belt still more southern than *Cybele*. *Idalia* alone is very generally distributed, though nowhere common, being found occasionally from Maine to Georgia, east of the Alleghenies.

The larvæ of *Atlantis* I am unacquainted with, but I am informed by Mr. Scudder that the late Mr. C. H. Shurtleff found both larvæ and pupæ at Eastport, Maine. He seems to have left no memoranda respecting them but the following, taken from his Journal; "they suspend themselves by the tail to rails, boards or logs lying on the ground."

ARGYNNIS.

VI.



Drawn by Mary Peart

Bowen & Co. Lith. Phila.

CALLIPPE. 1. 2. 3. 4. ♀.

ARGYNNIS VI.

ARGYNNIS CALLIPPE. 1—4.

Argynnis Callippe. (Cal-lip'-pe) Boisduval, Ann. Soc. Ent. de France, 2 ser. x. p. 302. 1852.

Primaries long, narrow, moderately arched, slightly concave on hind margin.

MALE. Expands 2.3 inches.

Upper side dull fulvous, very much obscured, the nervules being broadly edged with black, and inner angles of both wings and three-fourths the surface of secondaries, of same color; hind margins black, with heavy, confluent dentations; the discal interspaces of primaries and marginal spots of both wings of a paler fulvous than the ground color, and on secondaries an extra median row of still lighter spots, corresponding to the silver spots of lower surface, each starting from the black median band (which is confluent) and terminating in one of the rounded black spots; other markings of both wings as in the allied species; fringes yellowish, black at tips of nervules.

Under side of primaries fulvous at base and along the lower nervures and their branches; costa, outer half of cell and interspaces on the disk clear yellow; the outer limb mixed or mottled with fulvous; the submarginal serrations blackish next inner angle and almost wanting above, enclosing triangular spots more or less silvered; two silver spots on subapical patch.

Secondaries yellow, the basal two-thirds more or less mottled with reddish-brown of a darker shade than that of primaries; the band between the outer rows of spots clear yellow, immaculate; the silver spots are 23 or 24 in number, viz: the marginal row of seven, large, triangular, all edged above with brown; the second of eight, the first and fifth obovate, second and third long oval, fourth minute, sixth long and rectangular, seventh and eighth irregular, all edged slightly above with black; the third row of four or five, the first large, semi-oval, second often wanting, third pyriform, cut by the arc, fifth a streak, the first, third and fourth edged above with black; in the cell one or two small rounded spots, a third, long oval, at base of median, these wholly edged with black; a silver patch at base of costal; shoulder and abdominal margin silvered.

Body above dark fulvous, beneath, yellow on abdomen, greyish-yellow on thorax; palpi grey fulvous; antennæ fulvous; club black, ferruginous at tip.

FEMALE. Expands nearly three inches.

Color paler, fading to whitish on the disk and in the extra median and marginal spots of secondaries; the black markings heavier than in the male; under side paler, but similar to male.

ARGYNNIS VI.

From California. The most common or only species of *Argynnis* found in vicinity of San Francisco, according to Dr. Behr, who adds "it seems pretty universally distributed throughout our State. There exists but one generation, and the imago is found in June." Of the larva I can obtain no information.

It is difficult to determine this species from the diagnosis of Dr. Boisduval, which possibly includes at least two species, the other being *Coronis*, Behr. Dr. Boisduval does not notice the dark coloration of upper surface or the conspicuous pale spots of secondaries. But the present is the species designated by the name in our collections, and is so recognized by Dr. Behr in his paper on the *Argynnides* of California, *Ann. Acad. Nat. Sci. Calif.* 1862.

ARGYNNIS.
VII.



Drawn by Mary Peart

Bowen & Co. lith. Phil^a

HE SPERIS. 1 2. ♂. 3. ♀.

ARGYNNIS VII.

ARGYNNIS HESPERIS. 1—3.

Argynnis Hesperis, (Hes'-pe-ris) Edwards, ♂, Proc. Ent. Soc. Phil. ii, p. 502. 1864.

Primaries long, narrow, moderately arched, hind margin slightly convex.

MALE. Expands 2.3 inches.

Upper side deep fulvous, obscure at base; primaries have a narrow black hind margin; the submarginal spots serrate and confluent.

Secondaries bordered by two fine parallel lines on which the spots are serrate, sometimes dentate; the median spots form a narrow, confluent band, as in *Atlantis*; other markings of both wings as in that species; fringe yellowish, black at tips of nervules.

Under side of primaries pale fulvous inclining to luteous; the apex, upper part of margin, apical patch and upper serrations ferruginous; the spots within the latter buff; lower serrations blackish enclosing fulvous spots; the spots on patch buff as also are the apical interspaces.

Secondaries deep ferruginous, excepting the space between the two outer rows of spots, which is buff, and immaculate; (but occasionally this space is encroached on by the basal color, as in *Aphrodite*;) the spots are 23 or 24 in number, viz: the marginal row of seven, triangular, edged above with ferruginous; the second row of eight, mostly narrow and elongated; the eighth, on inner margin, lunular and incomplete; all but the eighth projecting a ferruginous shadow on the buff belt and all edged above with black; the third row of four or five, the first lunular, second minute or wanting, third semi-oval, cut into two by the arc, the lower part edged above with black, the fourth and fifth streaks; all these are edged above with black; within the cell one or two small round spots; an oval at base of median; these last wholly edged with black; a patch at base of costal; shoulder and abdominal margin greyish; all the spots are buff, some of them occasionally sprinkled with a few scales of silver.

Body above color of base; beneath greyish; palpi reddish-grey; antennæ fulvous, club black tipped with ferruginous.

FEMALE. Expands 2.4 inches.

Paler colored, but otherwise similar to the male.

Found in Colorado, and first taken by Mr. James Ridings in 1864. It seems to be not uncommon in that region.

ARGYNNIS.

VIII.



2



1



3



4

Drawn by Mary Peart

Bowman & Co. Lith. Phila.

MONTICOLA 12. ♂. 3. 4 ♀

ARGYNNIS VIII.

ARGYNNIS MONTICOLA. 1—4.

Argynnis Monticola, Behr, Proc. Cal. Acad. Nat. Sci. 1862, p. 172, and 1863, p. 84. *Zerene*, Boisduval, Ann. Soc. Ent. Fr. 1852, p. 303.

Primaries broad, moderately arched, slightly concave on hind margin.

MALE. Expands 2.6 inches.

Upper side bright fulvous, marked and spotted with black as in allied species; both wings edged by a double line which encloses fulvous spaces between the nervules; the submarginal spots are lunular on secondaries and lunular or dentate on primaries, connected with each other and with the marginal lines; the rounded spots on outer limb unusually large, except the fourth on secondaries and the four upper ones on primaries, which are minute; the median band on primaries heavy, the separate spots of which it is composed much diffused; that of secondaries heavy and confluent; the cellular spot of secondaries like the letter S, but varies much, being sometimes very open, and sometimes compressed into a round spot; fringes yellowish at the emarginations.

Under side of primaries bright red-fulvous over the whole base, disk and inner margin; costal and apical portions buff with a violet tinge next the hind margin; this margin and the apical patch brown; same markings as on upper surface; the submarginal spots blackish next inner angle, brown towards apex, enclosing severally fulvous or buff spaces; on the patch buff spots.

Secondaries violet brown more or less mottled with clear brown; between the two outer rows of spots a belt of rather paler shade than the ground color, much encroached on by the brown shadows projected by both rows of spots; hind margin brown; the spots are twenty two in number, viz: seven submarginal, long and very narrow, edged without by a few scales of black; eight median of moderate size, heavily edged with black above; the third row of four, all heavily edged with black above, the first and third crescent, the second cut by the arc, the lower part edged with black above; in the cell one, sometimes two, rounded spots and an oval below the median, surrounded by black; all these spots light buff without silvering.

Body above fulvous, below buff; legs light buff; palpi same color edged with fulvous; antennæ black above, fulvous below; club black tipped with fulvous.

FEMALE. Expands 2.8 inches.

Color somewhat paler than the male; the black markings heavy; the spots enclosed in the submarginal dentations paler than the ground. Under side like the

ARGYNNIS VIII.

male, the apical spot on primaries sometimes silvered, as also the outer row on secondaries.

According to Dr. Behr, (paper first cited) "the diagnosis of *Zerene*, Boisd., certainly comprises two species," one of which is now *Monticola* above described. In a letter from Dr. Behr, dated San Francisco, Aug. 16, 1868, he says, "*A. Monticola* is found in different localities from *A. Zerene*. It is more alpine, and is found in the Yo Semite valley and other mountain localities."

ARGYNNIS.

IX.



Drawn by Mary Peart

Printed by G. & C. B. Peck

HALCYONE 8

ARGYNNIS IX.

ARGYNNIS HALCYONE.

Argynnis Halcyone (Hal-cy'-o-ne). New species.

Primaries broad, moderately arched, concave on hind margin.

MALE. Expands 2.5 inches.

Upper side fulvous, inclining to luteous, very little dusky at the base; the hind margins bordered by two parallel lines which enclose narrow fulvous spaces between the nervules; the submarginal spots of primaries serrated, enclosing spaces a little paler than the ground color; those of secondaries lunular and connected with each other as well as with the marginal lines; the median band of secondaries confluent; other markings as in the allied species, less delicate than in *Hesperis*, but very much more so than in *Monticola*; fringes luteous, black at tips of nervules.

Under side of primaries pale fulvous at base and on inner margin, yellowish or buff on costa and disk, with brown sub-apical patch; hind margin yellowish-brown; sub-marginal spots serrate at inner angle and black, toward the apex lunular and brown, all the latter enclosing spots more or less silvered; on the brown patch two silver spots; the other markings of upper surface repeated.

Secondaries deep red-brown, more or less mottled with yellowish; hind margin brown, paler towards anal angle; the space between the two outer rows of silver spots encroached on by the basal shade; the silver spots are twenty two or three in number, viz: the outer row of seven, rounded or oval at outer angle, remainder elongated, all edged slightly above and below with black scales and surmounted by a broad brown shade; the second row of seven, the first three and fifth obovate, fourth small, rounded, the sixth and seventh nearly rectangular, edged above with black; the third row of four or five, the first and fourth crescent, second often wanting, third pyriform, cut by the arc, fifth on the margin, a streak, all edged above with black; in the cell a rounded spot, another below median, both surrounded with black; two small patches of silver at base of nervures; shoulder and abdominal margin heavily silvered.

Body above luteous, beneath yellowish; palpi yellowish; antennæ dark above, fulvous below; club black, ferruginous at tip.

Female unknown.

From two specimens, taken in Colorado by Dr. Velie, and now in the collection of B. D. Walsh, Esq. of Rock Island.

ARGYNNIS.

X.



Drawn by Mary Peart

LETO. 1.2 ♂.3.4 ♀.

Bowen & Co. Lith. Phila.

ARGYNNIS X.

ARGYNNIS LETO. 1—4.

Argynnis Leto, Behr, Proc. Cal. Acad. Nat. Sci., 1862.

Primaries broad, moderately arched, slightly convex on hind margin.

MALE. Expands from 2.6 to 3 inches.

Upper side pale fulvous, obscure at base, lightly marked and spotted with black; hind margins of both wings bordered by two fine parallel lines, between which the space is fulvous; primaries have a submarginal row of serrated spots, not touching each other nor the marginal lines; a transverse line of rounded spots, an indistinct bar on costal margin, sometimes wanting, a zigzag median band of separated spots, mostly lunular; outside the arc a spot shaped like the letter P inverted, and three sinuous bars across the cell.

Secondaries have a submarginal row of lunate spots, separated and not touching the marginal lines, a second of small rounded spots or points, and a median of small widely separated crescents in size and shape like those of *Aphrodite*; on the arc a pyriform or obovate spot.

Under side: primaries pale fulvous at base, light buff on costal margin and in the marginal interspaces, the nervules edged with brown; the sub-apical patch brown; submarginal spots serrated, enclosing buff spaces, not silvered, (in the specimens before me); other markings as on upper surface.

Secondaries dull ferruginous from the base to second row of spots; between the two outer rows a broad buff belt as in *Cybele*; the silver spots are twenty-one or twenty-two in number, viz, seven submarginal, lunate, edged with ferruginous below and above; the second of seven or eight, all but the last heavily edged above with black, and projecting a brown shadow upon the belt, the first, second and fifth largest, third and sixth half the size of the others, the fourth minute, the seventh and eighth (when present) streaks; the third row of three, edged also with black above; a small rounded spot in the cell, a patch at origin of median nervure and another at base of costal; costa at base and abdominal margin slightly, if at all, silvered.

Body above dark brown, beneath, abdomen yellowish; palpi fulvous; antennæ fulvous; club black tipped with fulvous.

FEMALE. Expands 3 inches.

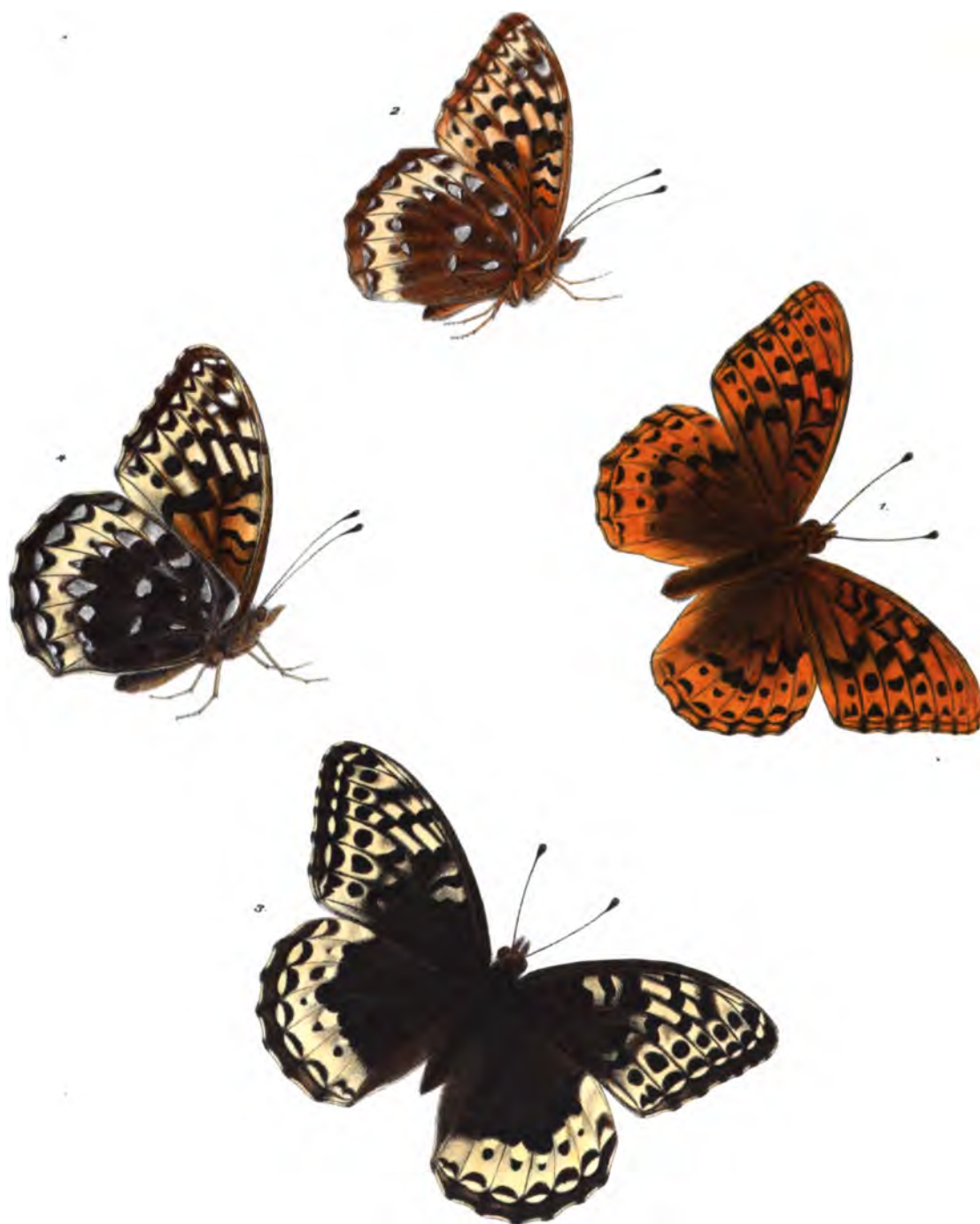
Color sordid-white, showing no fulvous except along the nervures; much obscured at base; marked as the male.

ARGYNNIS X.

From a male and female received by me from Dr. Behr, and two males in the collection of Mr. Tryon Reakirt, Philadelphia.

In Dr. Behr's original description he says: "*Leto*, female, has the hind wings black with a band of white spots in the middle and of orange ones near the margin as in *Idalia* male." After publication, Dr. Behr discovered the error of this description. In a letter, dated San Francisco, 1866, May 31st, he says: "The female (*Leto*) is not, as I supposed, marked on the hind wings like *Idalia*. I have now two females and find their design similar to that of male, only the black is more spread, and the ground color not as in the male, but very pale and nearly white. I received one from Oregon, from that part between the Cascade and Rocky Mountains, and have others from Yo Semite Valley, where it seems to be common. Probably the species has its range all along the higher regions of the Sierra Nevada and their prolongation, the Cascade Mountains, and extends from these into the desert table land wherever there is an oasis." On sending the specimens, 1867, Jan. 5th., he says: "The color of the female is the natural one. At least I never have seen any other than this pale color."

ARGYNNIS.
X.



Drawn by Mary Peart.

L. Bowen, lith. Phil^a

LETO. 1.2.♂, 3.4.♀.

ARGYNNIS X.

ARGYNNIS LETO.

Argynnis Leto, Behr, Proc. Cal. Acad. Nat. Sci. Phil. 1862.

Primaries broad, moderately arched, slightly convex on hind margin

MALE.—Expands from 2.6 to 3 inches.

Upper side pale fulvous, obscure at base, lightly marked and spotted with black; hind margins of both wings bordered by two fine parallel lines between which the space is fulvous; primaries have a submarginal row of serrated spots, not touching each other or the marginal lines; a transverse line of rounded spots, an indistinct bar on costal margin, sometimes wanting, a zigzag median band of separated spots, mostly lunular; outside the arc a spot shaped like the letter P inverted, and three sinuous bars across the cell.

Secondaries have a submarginal row of lunate spots, separated and not touching the marginal lines, a second of small rounded spots or points, and a mesial of small widely separated crescents in size and shape like those of *Aphrodite*; on the arc a pyriform or obovate spot.

Under side: primaries pale fulvous at base, light buff on costal margin and in the marginal interspaces, the nervules edged with brown; the sub-apical patch brown; submarginal spots serrated, enclosing buff spaces, not silvered; other markings as on upper surface.

Secondaries dull ferruginous from the base to second row of spots; between the two outer rows a broad buff belt as in *Cybele*; the silver spots are twenty-one or twenty-two in number, viz; seven submarginal, lunate, edged with ferruginous below and above; the second of seven or eight, all but the last heavily edged above with black, and projecting a brown shadow upon the belt, the first, second and fifth largest, third and sixth half the size of the others, the fourth minute, the seventh and eighth (when present) streaks; the third row of three, edged also with black above; a small rounded spot in the cell, a patch at origin of median nervure and another at base of costal; costa at base and abdominal margin slightly, if at all, silvered.

Body above dark brown, beneath, abdomen yellowish; palpi fulvous; antennæ fulvous; club black tipped with fulvous.

ARGYNNIS X.

FEMALE.—Expands 3 inches.

Upper side dark ferruginous-brown from base to middle of disk, and beyond, to the brown marginal band, greyish-yellow. On the under side, primaries have the base and inner margin port-wine color and the apical and costal portion, as far as middle of cell, greyish-yellow; secondaries have the basal two-thirds deep ferruginous, and between the two outer rows of spots a clear band of greyish-yellow, brighter colored than on upper side; spots as in the male.

This species has been found somewhat abundantly in the Yo Semite district of California and in Oregon. The males that have reached our collections are mostly in good condition, but with the exception of two females received from Oregon, through the kindness of Mr. Henry Edwards, all the specimens of that sex known to me have been faded out to a pale brown and sordid white, without a trace of their original beautiful coloring. The contrast between the sexes in this species is of same nature as in *Diana* and *Nokomis*, and it is a very curious problem how the sexes in these species have come to differ so remarkably when in nearly every other member of the extensive genus *Argynnis* they are essentially alike.

ARGYNNIS.

XI.



Drawn by Mary Fearn

Bowen & Co. Lith. Phila.

A EDWARDS II 12 & 3. 49

ARGYNNIS.

XI.



Drawn by Mary East

Printed by C. & J. Philp

A. EDWARDS ILL. 2. 3. 4. 9

ARGYNNIS XI.

ARGYNNIS EDWARDSII. 1—4.

Argynnis Edwardsii, Reakirt, Proc. Ent. Soc. Phil., 1867.

Primaries long and narrow, moderately arched; slightly concave on hind margin.

MALE. Expands nearly 3 inches.

Upper side pale fulvous, a little dusky at base, marked and spotted with black; hind margin edged by two fine parallel lines, on which rest a series of connected lunules, which enclose fulvous spots a shade paler than the ground color; other markings as in the allied species, rather more delicate than in most; a sagittate spot in the submedian interspace near base.

Secondaries have the extra discal spots small; a discal band of small separated lunules; the spot on the arc like the letter C; fringes luteous in the emarginations.

Under side of primaries pale reddish fulvous at base and along the posterior nervules; remainder of wings light buff, except the apex and hind margin, which are greenish; the submarginal silver spots are seven in number, triangular, the three posterior ones edged by blackish sagittate spots; three anterior subapical spots silvered, the middle one large, sub-ovate.

Secondaries pale olivaceous somewhat mottled with buff; the band between the two outer rows of silver spots much encroached on by the ground color, as in *Aphrodite*; the silver spots are twenty-four in number; viz. seven submarginal, large, lunular or sub-triangular, each edged above by olivaceous; the second row of seven, the fourth minute, the others large, mostly sub-ovate, slightly edged above with black, and below projecting olivaceous shadows on the band; the third row of five, the first and fourth lunular, the second minute or wanting, the third large, pyriform, cut by the arc, the fifth a stripe on the margin, all edged above with black; in the cell one or two rounded spots and three at origin of the nervures; shoulder and abdominal margin silvered.

Body above fulvous, below buff; legs and palpi fulvous; antennæ dark brown above, light below; club black, ferruginous at tip.

FEMALE. Expands 2.8 inches. Primaries shorter, hind margin straight.

Upper side obscured by black, much as in *Callippe*, showing like that species pale lunules within the submarginal spots and a discal row of pale spots corresponding in shape to the second silvered row of under side; apex of primaries also paler than the ground color; hind margin of primaries broad, blackish, of secondaries similar in color, but of medium width.

ARGYNNIS XI.

Under side as in male except that apex and hind margin of primaries and whole of secondaries are of a deeper olivaceous, a paler shade of same color tinting those parts that in the male are buff; the silver spots large, the outer row triangular, slightly edged by black above; the spots little if at all edged by black.

Larva unknown.

From specimens taken by Mr. James Ridings in the mountains near Empire City, Colorado, in August 1864.

This species had been known in collections for several years prior to Mr. Ridings' expedition, from the collecting of Messrs Wood, Drexler, and others, and had been erroneously taken for *Aglaia*, an European species to which it bears some resemblance. As Dr. Behr has remarked "nearly all the Californian Argynnides (which includes the Rocky Mts. and Eastern species as well) belong to the type of *Aglaia*, which is altogether more developed and more numerously represented on this continent than in the old world, where the type of *Paphia* takes its place."

ARGYNNIS.

XII.



Drawn by Mary Fearn

Bowen & Co. Lith. Phila.

EPHEMERA 12 6 3 4 9.

ARGYNNIS XII.

ARGYNNIS BEHRENSII. 1—4.

Argynnis Behrensi, Edwards, Trans. Amer. Ent. Soc., 1870.

Primaries narrow, slightly arched, concave on hind margin.

MALE. Expands 2.2 inches.

Upper side dull fulvous, much obscured at base; primaries bordered by two fine parallel lines enclosing very narrow fulvous spaces between the nervules; resting on these a series of small black crescents, each enclosing a fulvous spot; the round submarginal spots of medium size; other markings as in *Hesperis* and allied species.

Secondaries have a double marginal line enclosing large fulvous spaces; the lunules large, crescent, not quite touching each other or the line; the rounded spots small; the median row confluent, forming an unusually narrow band, much like that of *Hesperis*; on the arc a recurved black spot enclosing a narrow fulvous space; between the submarginal spots and median line a row of pale fulvous spots corresponding to the second silvered series beneath.

Under side: primaries light buff, at base and along the nervules pale ferruginous; on hind margin and at apex dark brown; the marginal spots sagittate, black next inner angle, deep brown above and near apex lost in the ground color; the upper five enclosing silver spaces; on the sub-apical patch three silver spots; other markings as above.

Secondaries of a deep, dense ferruginous, (much as in female *Aphrodite*) which color occupies the whole wing except a narrow violet-brown space between the outer rows of spots; these are twenty-one or twenty-two in number, all silvered, viz: seven submarginal, narrow, elongated, edged above by broad ferruginous crescents; a second row of seven mostly oval or pyriform; a third of five, of which the first and third are semi-oval, the second a point, fourth and fifth streaks on the margin; both the two last rows narrowly edged with black; in the cell a round spot and a point; an oval at base of median, another at base of costal; shoulder and abdominal margin lightly silvered.

Body above fulvous; beneath, abdomen buff, thorax covered with gray-fulvous hairs; palpi fulvous; antennæ black above, fulvous below; club black, tip ferruginous.

ARGYNNIS XII.

Female. Expands 2.4 inches. Upper side of a duller shade; the marginal borders of primaries broad, black, with no fulvous space; the submarginal crescents heavy, enclosing very small pale fulvous spots; other markings heavier than in male.

Under side similar to male, except that primaries have the base and hind margin deep fulvous; secondaries have the same ferruginous tint with a similar violet-brown submarginal space.

Taken at Mendocino, California. From 1 ♂, 1 ♀, in the Collection of James Behrens, Esq., San Francisco, to whom I take pleasure in dedicating this fine and distinct species.

ARGYNNIS.

XXIII.



Drawn by Mary Peart

Bowen & Co. Lith. Phila.

ZERENE. 1 2 3 3 4 ♀

ARGYNNIS XIII.

ARGYNNIS ZERENE. 1—4.

Argynnis Zerene, Boisduval, Ann. Ent. Soc. Fr., 1852. Behr, (No. 9) Proc. Cal. Acad. Nat. Sci. 1862. Edwards, Proc. Ent. Soc. Phil., 1864. *Hydaspe*, Boisduval, Lep. de la Cal'e., 1869.

Primaries broad, strongly arched, much rounded at apex, convex on hind margin.

MALE. Expands 2.1 to 2.3 inches.

Upper side deep fulvous; hind margins edged by two fine parallel lines which enclose a fulvous space; on these rest a series of heavy black lunules, connected on primaries, separated on secondaries; other markings as in *Monticola*; fringes yellowish in the emarginations.

Under side of primaries cinnamon red except at apex, where it is buff; sub-apical patch ferruginous; spots without silver, buff except at inner angle, there suffused by the ground color.

Secondaries ferruginous, mottled with buff, which is usually more or less tinted with pink; submarginal band much covered by the ferruginous shadows projected by both rows of spots; hind margin ferruginous; spots yellowish buff, without silver; the seven submarginal large, rounded or triangular, edged above and below by a few dark brown scales, and above also by ferruginous lunules; the second row mostly large; the first, second, third, fifth and sixth, nearly equal in size, subovate, all heavily edged above with black; the third row of five, of which the first, fourth and fifth are semi-oval, the second a point, the third large, pyriform, cut by the arc, all heavily edged above with black; in the cell one or two small spots in black rings, and an oval in ring at base of median.

Body above fulvous, below, thorax grey-fulvous; legs buff; palpi buff below, fulvous above; antennæ brown; club black, tip ferruginous.

FEMALE. Expands 2.4 inches.

Upper side dull fulvous, much obscured at base; the sub-apical fulvous spots pale; under side of primaries deeper red; spots without silver.

California; found according to Dr. Behr, between Nevada City and Bear Valley.

In 1862, in paper above cited, Dr. Behr says, "The diagnosis that Dr. Boisduval gives of *Zerene* certainly comprises two species," and he temporarily designates the two as Nos. 8 and 9 in his list of Californian *Argynnides*. In his subsequent paper of 1863, he names No. 8 *Monticola*, leaving *Zerene* to the other species.

ARGYNNIS XIII.

In 1864, Proc. Ent. Soc. Phila., I translated Dr. Behr's description, applying the name *Zerene*, Bois., to the species No. 9.

In 1869, Dr. Boisduval published his second paper on Californian Lepidoptera, utterly ignoring all that had been done by lepidopterists since 1852, and named as new thirty-five species of butterflies, the greater part of which have been described in Proceedings of scientific societies years ago. In the other orders Dr. Boisduval has proceeded with like indifference.

In the last paper he intimates that his former diagnosis of *Zerene* includes two species, and he applies that name to *Monticola* Behr, giving to the other, that of *Hydaspe*. Nevertheless according to the recognized rule in such cases, the names *Monticola* and *Zerene* will remain as Dr. Behr determined them.

In both these papers the very general descriptions given often apply to two or more species, and some of them will continue to be a puzzle to students who have no access to the types in Dr. Boisduval's collection. In many other cases it is impossible to tell what the descriptions are intended to represent, as in *Anthocaris lanceolata*, *C. Amphidusa*, *P. Leucodice*, *Mel. Pulchella*, *M. Cocyta*, &c. There is also a constant tendency to discern European forms under what are called "local modifications," as in cases of *A. Ausonoides*, *C. Eurytheme*, *Thecla dumetorum*, *Coen. Californica* and *Galactinus*, *Thanaos Cervantes*, *Hesperias Comma* and *Sylvanus*, which is calculated to perplex and mislead. With profound respect for Dr. Boisduval, every lepidopterist in this country has cause to regret the confusion thus introduced into our fauna.

ARGYNNIS.
XIV.



4



1



2



3

Drawn by Mary Reart

T. Sinclair Lith Phila

NEVADENSIS. 1. 2. ♂ 3. 4. ♀.

ARGYNNIS XIV.

ARGYNNIS NEVADENSIS. 1—4.

Argynnis Nevadensis, Edwards, Trans. Am. Ent. Soc. iii, p. 14.

Primaries long, narrow, strongly arched, convex on hind margin.

MALE. Expands 2.2 inches.

Upper side pale yellow fulvous, slightly obscured at base; hind margins bordered by two parallel lines, enclosing throughout narrow fulvous spaces between the nervules; the submarginal lunules narrow, serrated or lunular, connected with each other and with the marginal lines; and enclosing large concolored fulvous spots, other markings delicate, well defined, similar to those of *Edwardsii*; the median band of secondaries being confluent and the discal spot large, open, much like the letter C inverted; fringes luteous, on primaries blackish at ends of nervules.

Under side of primaries pale buff, next base and inside the two cellular spots with a faint reddish tint; apex olivaceous; the two lower submarginal spots black, enclosing buff spaces, the others, six in number, olivaceous enclosing silver spots; submarginal patch olivaceous with two silver spots and sometimes a third on the margin. Secondaries yellow, the disk mottled with olivaceous; the band between the two outer rows of spots narrow, distinct; the silver spots unusually large, iridescent, 24 in number, viz: seven submarginal, sub-triangular, edged both above and below by black scales and above by a broad olivaceous border; the second row of seven, the first three, fifth and sixth nearly equal, subovate, the fourth small, triangular, the seventh subquadrate, all narrowly edged above with black and projecting olivaceous shadows upon the band; the third row of five, the first semi-oval, the fourth and fifth lunate, the second obsolete, third large, sub-pyriform, cut by the arc, all narrowly edged with black; in the cell two small round spots and below median a long oval, these three edged with black; two silver patches at margin of upper nervures; shoulder and abdominal margin lightly silvered. Body above fulvous, beneath buff; legs buff, palpi buff, ferruginous above and at tip; antennæ brown above, fulvous and grey beneath; club black tipped with ferruginous.

FEMALE. Expands 2.8 inches.

Color a shade paler; the marginal lines diffuse, on primaries forming a broad black band showing traces of fulvous spots only next inner angle; the spots within

ARGYNNIS XIV.

apical lunules whitish; secondaries present a row of spots, a shade paler than the ground, corresponding to the second silvered row of under side.

Under side of primaries yellow buff, deep fulvous at base, on inner margin throughout, and over three fourths of cell, passing into reddish buff towards inner angle; sub-marginal spots enclosing, throughout, silver spaces. Secondaries pale buff, mottled with darker shade; silver spots large, the second row completely but delicately edged with black, the sub-marginal nearly ovate.

Taken in the valleys of the Sierra, near Virginia City, Nevada.

In the markings of upper side and in the form and size of the silver spots, *Nevadensis* is nearest *Edwardsii*.

Mr. Henry Edwards, to whom we owe the discovery of this fine species, writes as follows respecting it. "The range of *Nevadensis* appears to be very limited as I have only seen it in the immediate neighborhood of Virginia, but it is there by no means rare. It loves to fly about the warm cañons of the mountains and is especially abundant near Washoe Lake. This is a beautiful sheet of water about two miles wide by seven long almost on the summit of the spur of the Sierra of which Mt. Davidson is the highest peak and on the sides of which Virginia is built. It is nearly 6000 feet above the sea level and its shores are covered in the Spring with a luxuriant growth of Compositæ, Violaceæ and Liliaceæ. About this Lake during this summer (1870) I saw scores of *Nevadensis*, but I only captured a few, owing to their wonderfully swift flight. I rarely saw them alight and it was necessary to take them on the wing. The males are very pugnacious and chase each other with great earnestness. The capture of our mountain butterflies is always a task of difficulty from the uneven nature of the ground, and frequently the work is terrible. One has to toil over dry mountains covered with "sage brush," with not a tree in sight, and rarely is a drop of water to be found throughout a days tramp."

NOTE.—Since the publication of the plate of *Arg. Edwardsii*, that species has been confidently asserted by no less eminent authorities than Dr. Staudinger and Mr. Möschler to be identical with *Aglaiia*.

Dr. Staudinger writes, 6th April, 1871: "There is not the least doubt that *Arg. Edwardsii* is *Arg. Aglaila*, Linn. There is not the least difference and the *Aglaila* from Asia differ much more from the true European type than your *Aglaila* of Colorado, which differs only in name."

I am not advised that either of these naturalists have any acquaintance with the American species beyond what is to be gained from my plate and description. Certainly the insect is as yet excessively rare in collections.

At the date of publication of the plate, (1869) I had the use of the few specimens collected by Messrs Wood, Drexler and Ridings, which comprised, so far as I knew, all that were to be found in collections in this country. Quite lately, Mr. T. L. Mead has placed in my hands a number of specimens taken by him, in June

ARGYNNIS XIV.

of the present year, (1871) in Colorado, viz. 15♂, 6♀, all of which are fresh and in the best possible condition. With sufficient material therefore for comparison, I am at a loss to see the resemblance between this species and *Aglaia*. Indeed it is not too much to say that they belong to different sections of the genus. They constantly differ in size, in the form of the wings, in color, and in the number, size and shape of the silver spots. The form of the fore-wings is a distinguishing characteristic between species of this genus, and so is the size and shape of the silver spots, especially the sub-marginal spots of both wings. Dr. Behr, in his paper on Californian Argynnides, Proc. Cal. Acad. Nat. Sci. April 21, 1862, says "of great importance for the diagnosis of these specimens is the shape of the marginal lunulæ."

So also does the presence or absence of a clear buff or yellow band between the two outer rows of silver spots constitute a highly important distinction, as is strikingly exemplified in *Cybele* and *Aphrodite*, for which I refer to the plates of those species in this Volume.

As to the species in question, in size, *Edwardsii* is at least from one third to one half the larger in superficial area. As to shape of fore-wings, in the male *Aglaia*, these are *broad, strongly arched, not at all produced* apically and as nearly as possible *straight on hind margin*. In the female they are distinctly *convex* on hind margin.

In the male of *Edwardsii*, the fore-wings are remarkably *long, narrow, much produced* apically, *slightly arched* and distinctly *concave* on hind margin. In the female the wings are shorter and broader than in the male, but the margin is *straight, not rounded*. Mr. Reakirt says, "The wings of this species are relatively more narrow and more elongated than in any member of this genus with which I am acquainted."

The margin of the hind wing in the female is not *circular* as in both sexes of *Aglaia*, but *the wing is produced so that the outline is oval*, and from the anal angle to upper median nervule the margin is *not curved, but straight*.

In *Aglaia*, I have seen no specimen with more than the faintest traces of sub-marginal silver spots on under side of fore-wings—merely a few silver scales—and none of sub-apical silver spots. The figure of Esper represents no such spots and that of Humphreys *very small marginal lunular spots*. Westwood, in the description, makes no mention of them. On secondaries *the spots are small*; the third row from the margin consists of three only, and of these the middle one is *truncated*, stopping at the arc; the spots of the second row are *small and rounded* and the sub-marginal are *small, narrow, and lunate*.

In *Edwardsii*, on the fore-wings are *seven conspicuous submarginal silver triangles and three sub-apical spots*, ten in all; besides these, in fresh specimens, two or three of the rounded black spots in the mesial row are always more or less silvered. On secondaries are 24 distinct spots. The third row contains five, the middle one of which is *very large, sub-pyriform*, cut by the arc; of the second row, six are *large, nearly equal in size, sub-ovate*; the submarginal are *large and triangular*. In the female all these spots are found, but they are still more conspicuous, and the submarginal especially so.

ARGYNNIS XIV.

In short, the species is remarkably silvered. The silver spots also are heavily edged with black, quite contrary to what appears in *Aglaia*.

As to color, passing by the upper surface as of less consequence, though the shades of fulvous are different in both sexes, in *Aglaia*, three fourths of the under surface of the fore-wings is tinted with *dull fulvous*, the *submarginal portions only* being ochraceous; the secondaries are of a *chrome-green* mottled with ochraceous from base to second row of silver spots, *and the band between this and outer row is broad, ochraceous* and not encroached on by the basal green color.

In *Edwardsii*, *deep fulvous* covers half the cell of fore wings and that part of the interspaces next below the cell, and the median nervures are narrowly bordered with same color nearly to the margin; the remainder of the cell and all the upper interspaces being a bright buff. In the female the basal color is intensified to a *fiery red*, covering the whole of the two inferior median interspaces. In the male, the ground color is *pale olivaceous* mottled with buff, with a *very narrow buff band* between the silvered rows. In the female the whole wing except the submarginal band *is olivaceous upon a brown ground*, giving a mottled appearance to the surface; and at the margin and anterior to the marginal spots it is wholly brown; the *sub-marginal band is of a brighter green*, owing to the absence there of the sub-color.

These differences are specific and it is not necessary to look for others of minor importance.

On referring to Humphreys as cited, the very title of the species indicates the peculiar color of the under surface of secondaries; "A. *Aglaia*. The Dark Green Fritillary." The description reads. "The outer margin of the fore-wings in the males is *almost straight* or scarcely perceptibly concave, whilst that of the females is *distinctly rounded*. Beneath, the hind wings are varied with *green and yellow* with about seven silvery spots at the base, an irregular row of seven silver spots beyond the middle of the wing and a row of seven submarginal.

Two varieties are mentioned by Westwood and one is figured under the name *A. Charlotta*, neither of which have any nearer approach to the American species.

Godart says of *Aglaia*, "The silver spots are usually *small* and *round*."

I have thought it well to go thus into details as to the distinction between *Aglaia* and *Edwardsii*, as perhaps, and with as good reason, *Nevadensis* may be pronounced a variety of *Aglaia*.

For if *Edwardsii* is *Aglaia*, and there is not "the least difference except in name," we may as well deny specific characters altogether, or call all green forms one species, all brown another and so on.

The truth is, the sooner the theory of identity between the European and North American fauna in this department is exploded the better. It is founded on the merest modicum of fact, and leads its advocates into inconsistencies and contradictions. Unquestionably, certain boreal and alpine butterflies have passed from one continent to the other in high latitudes, as have a few strong flying *Vanessans* and *Coliades*, but I believe the whole number common to the temperate regions of both continents can be counted on one's fingers.

MELITAEA.

I.



Drawn by Mary Peart

Bowen & Co. Lith. Phila.

CHALCEDON. 1 2 ♂ 3 4 ♀.

MELITÆA I.

MELITÆA CHALCEDON. 1—4.

Melitæa Chalcedon, (Chal-ce'-don) Boisduval; Doubleday and Hewitson, Gen. Diur. Lep. pl. 23; Ann. Ent. Soc. de Fr. 1852. Edwards, Proc. Ent. Soc. Phil. 1862.

MALE. Expands about two inches.

Upper side black spotted with pale ochrey yellow in transverse sinuous bands; the hind margins edged by a series of red spots, sometimes conspicuous, but usually small, rather indistinct and occasionally wholly wanting; the yellow spots vary much in individuals, both as to size and form; but usually the first on sub-marginal row of primaries is minute, the second of medium size, bifid on costal margin, the spots of the inner branch partially red; the third row somewhat larger than the second; in the cell a compressed bar, a spot near base, and on inner margin a third. On secondaries the first two yellow rows are composed of small spots, but those of the third are large and elongated; four yellow spots near base.

Under side of primaries bright brick red; the marginal border broad, concolored, and presenting on its anterior edge a series of deep yellow lunules, those next inner angle frequently obsolete; beyond this a second row of rounded spots, one or two patches on costa and sometimes a spot in cell; a black line on the arc and two transverse lines in cell. Secondaries have also a red marginal border, a submarginal series of large yellow lunules on a black ground, preceded by a row of rounded deep red spots on a black ground, each edged by a delicate yellow border; across the disk a band of large yellow spots, divided by the black lunules and cut unequally at either extremity by a transverse black line; next beyond this a red band, expanded in cell and there enclosing a yellow spot in a black ring; at base of nervures four yellow spots, and another on shoulder.

Body above black, the segments of the abdomen edged with yellow, and towards the extremity with red; sides of abdomen red, below yellow; thorax yellow; legs and palpi red; antennæ black above, red below; club black.

FEMALE. Expands 2.5 inches.

Primaries broader, more rounded apically; spots larger.

MATURE LARVA. Length 1.5 inch. Color black, finely irrorated with white; head black, bilobed, compressed, furnished with simple black spines; on body, from third segment to last, seven rows of thick, many branching spines, the dorsal

MELITÆA I.

row orange, the others blue-black, those of second lateral row rising from tuberculated orange spots; legs and pro-legs black.

CHRYSA LIS. Length .7 inch. Cylindrical; color pearl-white, marked with patches and points of dark brown; on the abdomen several rows of orange tubercles.

Mr. Henry Edwards speaking of *Chalcedon* says:—"The perfect insect appears to be generally distributed throughout the State, extending also into Oregon and Nevada. The first individuals make their appearance about the second week in April and successive broods are hatched up to middle of July. The caterpillar feeds upon *Scrophularia* chiefly, though I have observed it upon *Mimulus*, *Calistegia* and *Labium*. It is one of the most abundant of our species, every cañon leading from the mountain chains to the valley below being productive of large numbers. It is an active insect, seldom remaining settled in one place and is very pugnacious, driving away every other butterfly which may venture near it. On this account it is very troublesome to the collector and I have lost several rare insects entirely through this habit of *Chalcedon*. Like all *Melitæas*, it is subject to considerable variation, in some individuals the reddish patches covering nearly the whole of the upper surface of the primaries. The female is far less common than the male, is inactive and flies but little."



GRAPTA.

I.



Drawn by Mary Fearn

Revised by E. H. Cresson

FAUNUS 1 2 ♂ 3 4 ♀





GRAPTA I.

GRAPTA FAUNUS. 1—4.

Grapta Faunus, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.

MALE. Expands 2.1 inches.

Primaries deeply incised on both hind and inner margins; hind margins throughout irregularly dentated; a prominent tail on middle of secondaries and a smaller one between this and the anal angle.

Upper side deep orange fulvous, paler next apex of primaries; base of both wings and abdominal margin of secondaries a little dusky, the latter clothed with long hairs; primaries have a broad black hind margin, dilated at the apex, bordered within by a series of obsolete tawny lunules; on the inner margin a large black spot joins the marginal band, there enclosing a tawny spot; on the costal margin near apex, a broad abbreviated bar, black without, ferruginous within, runs obliquely back almost to the marginal band; from the middle of the costa a broad black bar extends to the median nervure, covering the arc; within the cell two round black spots in a transverse line and a third a little back of the same line near inner margin, divided unequally by the lower median nervule; in the median interspaces, two rounded black spots placed nearly at right angles to the first three; costal edge of both wings and the incision of inner margin of primaries sprinkled with black and tawny; the hind margin of secondaries is black slightly tinted with fulvous, clouded within, and passes gradually into the basal color, occupying nearly half the wing; costal margin broad, brownish black; on this is an elongated black spot, below which, nearer the cell, is a second, and in the middle of the wing a third, divided by the nervure; fringe white in the emarginations.

Under side. Both wings dark brown next base, with an irregular common blackish band across the middle, darkest on its outer edge and within the abdominal margin, where its outline is obliquely serrated; beyond this band, the color is paler brown mottled with grey white, which is clearest on costa of primaries; the whole surface clouded with vinous, and more or less crossed by fine abbreviated streaks of dark brown; apex of primaries yellow brown, with three small lanceolate, ferruginous spots, the lower one enclosing a blue or green point; the hind margin of both wings, below these, is bordered by a series of confluent blue black, sometimes olive green spots, following the outline of the wing; a little anterior to this, another series of rounded spots of same color. those on secondaries largest and some-

GRAPTA I.

times having black centres, on primaries minute, except the two at the ends of the row; in the disc of secondaries, a white G, varying in form, but usually thick and angular with each end sharp and barbed; body above black, covered with greenish hairs; below, brown grey; antennæ dark brown above, whitish below; club black with a yellow tip.

FEMALE. Expands 2.8 inches.

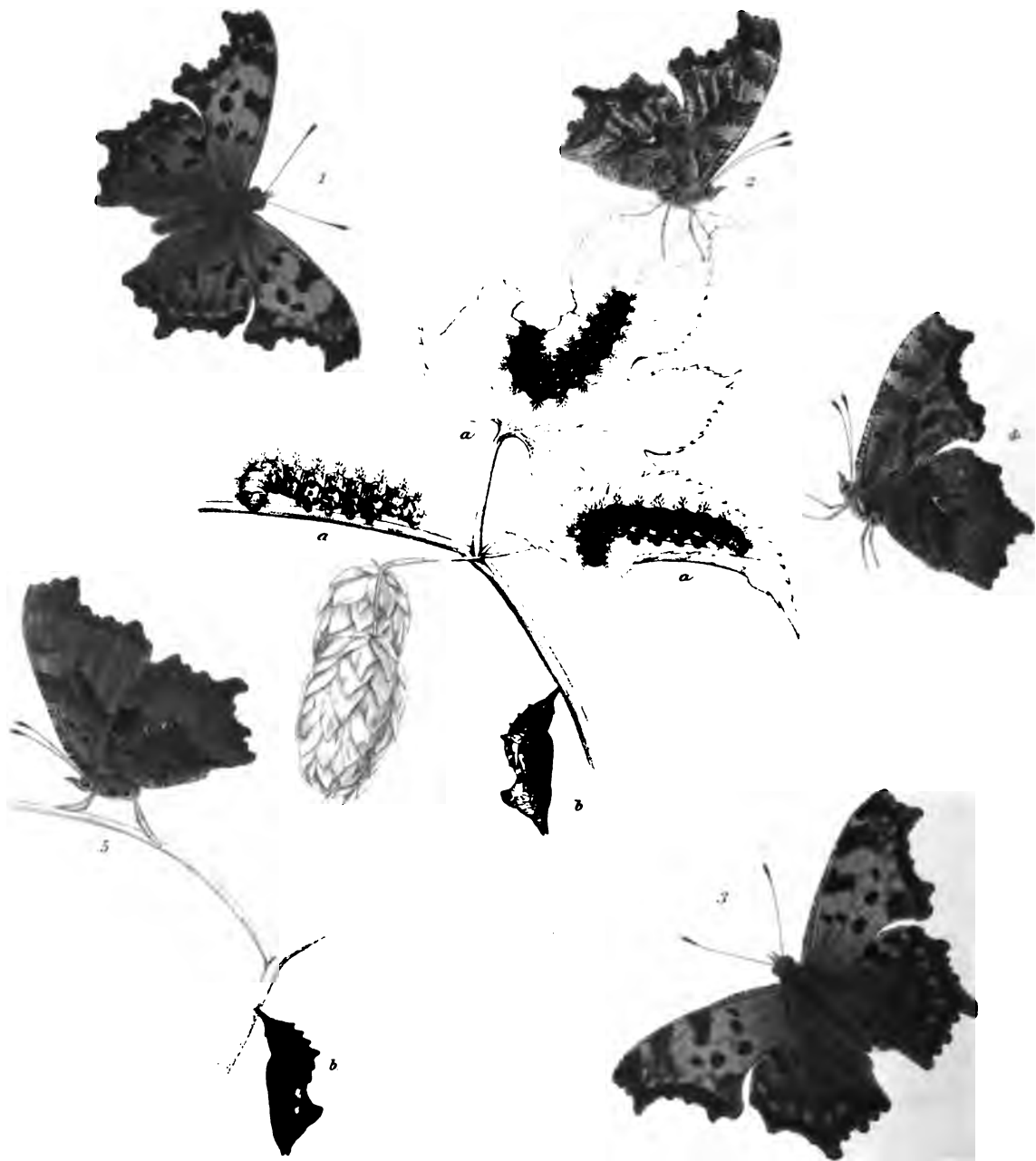
Hind margin of primaries less incised and the dentations, especially of secondaries, less prominent. Color of upper surface a shade more yellowish than in male. The under side in some cases marked as in male, but of duller colors, and the separate markings much less distinct. In most however the color is greyish-brown, darker next base; the submarginal lines and green spots showing faintly; the silver mark delicate, usually open and like that of *Progne*, but sometimes an angular C.

Larva unknown.

This species is very common in the Catskill Mountains in the month of August, frequenting the forest roads in company with a few *Progne* and *Comma*, and is of similar habits. It is deeper colored than its allies and the black markings are of greater extent, making it a conspicuous species. It is usually seen alighted on the ground, and although alert and quick in its motions, may be captured without difficulty. The species is also common in the Adirondacks and White Mountains, and probably throughout the northern part of the continent. I have received it from Fort Simpson and from Rupert House, Hudson's Bay, and also from Nova Scotia.

GRAPTA.

III.



Drawn by Mary Peart.

T. Sinclair's Ink Photo

COMMA, 1, 2, ♂, 3, 4 ♂, 5 ♀ VAR.
a. Mature larvae.
b. Chrysalides.

GRAPTA II.

GRAPTA COMMA. 1—5.

Grapta Comma, Harris, Ins. Mass. *C-album*, Fitch, New York Reports, 1856.

MALE. Expands 2.3 inches.

Primaries deeply incised; hind margins slightly dentated; a broad tail of medium length on middle of secondaries.

Upper side bright fulvous; primaries have a black marginal band of medium width, dilated at apex, edged within by a series of pale yellow spots; on inner margin a ferruginous patch joins the marginal band; a similar sub-apical patch on costa; on costal margin a broad sub-rectangular black patch; within the cell two small rounded black spots transverse, and at right angles to these three others in the submedian and first and second median interspaces; costal edges of both wings, and the incision of inner margin of primaries, sprinkled with black and yellow or pale fulvous. Secondaries have the outer limb deep ferruginous and the rest of wing to base mottled with ferruginous and fulvous; a sub-marginal series of small yellow lunules; on costal margin a large, elongated black spot, another of small size at base of first sub-costal nervule and a third at base of second median; fringe of both wings fuscous, whitish in the emarginations; the margins themselves narrowly edged with purplish.

Under side mottled in shades of brown and yellow; the basal space limited by a line, angular on primaries, wavy on secondaries, next inside which the color is darkest, next base greyish; in cell two long, narrow, dark spots; extra basal space greyish; apex of primaries dark brown, often castaneous, enclosing on the edge a yellowish spot or lunule; sub-apical patch grey-brown inclining to white; along the incision a broken or wavy stripe of metallic blue, anterior to which is a row of black points, distinct at the extremities and the posterior ones enclosed in olivaceous patches; costal edge specked with brown, grey and buff. On secondaries the extra basal space is mottled with brown, grey, olivaceous and yellow; the sub-apical patch olivaceous or castaneous, as is also the curved stripe extending from this patch to anal angle; along the margin a line of metallic blue lunules partly separated from the patch and stripe by yellow; a row of black points as on primaries; the silver C varies in size and form, being thick, rounded and barbed, or delicate and open with no barb; occasionally also interrupted as in *Interrogationis*; the whole surface of both wings inscribed with fine brown abbreviated lines.

GRAPTA II.

Body above dark fulvous, the thorax covered with greenish hairs; below grey ferruginous; legs pale buff; palpi buff, fulvous at tip and on upper side; antennæ dark brown above, buff below; club black, yellowish at tip.

FEMALE. Expands 2.5 inches.

Rather less incised than the male and on upper side similar. Under side varying between dark brown and yellow brown; in either case a grey shade over the extra basal space, and the markings nearly lost in the ground color.

Comma is found in the Eastern and Middle States and at least as far West as Illinois. And also in Canada and British America. I have received it from Nova Scotia and from Fort Simpson, Mackenzies River. It is rather local, but where it is found it is abundant. It is one of the commonest species on the Kanawha River, there being several successive broods from early in the season to November.

The larva is found on the hop, nettle and false nettle (*Boehmeria*) feeding singly. It conceals itself on the under side of a leaf the outer edges of which are drawn together by silken threads sufficiently to afford a protection from light and the weather. From this cover the larva emerges at night to feed, and beginning at the extremity of the leaf consumes it evenly across until not enough is left for shelter when it betakes itself to another and repeats the same process. Owing to this peculiarity this species is easily discovered, as the bent and eaten leaf betrays its presence.

The egg is nearly spherical, rather smaller at top than at bottom, depressed slightly at either end, ribbed vertically, pale green and one sixteenth of an inch in diameter. It is usually laid upon the surface of a young leaf, or, in case of the hop upon one of the tendrils, near the extremity. The young larvæ appear in four days, are one tenth of an inch long, black covered with short hairs, and like all young larvæ of butterflies, have the faculty of spinning threads whereby they attach themselves to the leaf or break their fall in case of danger. As they become older and can better adhere to the leaf no such aid is required, but whenever necessary for safety, as in a glass breeding cage, they will cover their path with a web and walk securely as on a rough surface.

When one-third grown these larvæ are black, with dorsal and first lateral rows of spines pale green more or less tipped with black, the second lateral row of spines black tipped with white and the lowest, or infra-stigmatal row, entirely white resting at base on greenish papillæ; the head spines black; between the first two lateral rows are narrow, transverse whitish striæ; from base of each dorsal spine fork greenish bars to anterior edge of the segment and similar bars start from the base of each of the first laterals; the spiracles oval, black within a white ring.

At the next moult all the spines become white and at the base of the second

GRAPTA II.

laterals, on 8th to 11th segment inclusive, appears a ferruginous point. With very little change this type reaches maturity. Other larvæ are almost wholly black to maturity, wanting the dorsal and lateral green spots and showing merely transverse striæ on each segment. Others are black while young, but when one-third grown become greenish white with faint shades of black interspersed as if seen through a semi-transparent skin. And others again are like the last mentioned but have a reddish or vinous tint instead of black. I have not been able to discover that the variation of the larvæ has any connection with the sex or with the shades of color of the butterfly.

The length of the mature larva is 1.25 inch. When about to transform it selects a convenient place, on the under side of a projecting rock, or of a fence rail, or of a weather board of the house, or the midrib of a hop-leaf, and having spun a little button of pale red silk fixes the hooks of its anal legs therein and hangs suspended, head downwards, in the shape of a fish-hook, and immovable, for the space of twenty to twenty-four hours, no change being perceptible except in the color of the skin which becomes partly transparent and loses its dark color, owing to its gradual parting from the chrysalis within. Suddenly, and to a looker on without any premonitory symptom, a rent takes place in the skin at the back of the head just wide enough to allow the passage of the chrysalis, the head of which at once emerges. By a rapid contraction and expansion of the folds of the abdomen the larva draws the skin upwards successively discovering the parts of the fully formed chrysalis, until at last, and in scarcely more than one minute of time, the entire skin is gathered about the anal feet. It now bends itself violently to disengage the end of the chrysalis, which is long, pointed and hard, furnished with several little hooks, meanwhile retaining its hold of the skin by the folds of its abdomen, until after a severe effort convulsively reaching out and feeling in all directions for the object of its search, it touches the button of silk and at once grasps it with its hooks and fixes them in it securely. Then by a twisting motion it manages to disengage the loose skin, which falls to the ground, and the chrysalis rests. The whole process is most interesting to witness and excites renewed wonder with every repetition, at the ingenuity of the means employed and the delicacy of the instinct displayed. How to strip off the skin and much more the legs by which the creature is suspended, without losing its hold, and at same time to securely fasten the chrysalis, is a problem that would seem impossible to solve, and yet this little insect accomplishes it unerringly, when to fail would be certain destruction. And not this species only, but the larvæ of all butterflies which form suspended chrysalids, embracing the whole of the great family of Nymphalidæ, that is, a large proportion of all existing species of butterflies, undergo a similar transformation.

The chrysalis is now green in color, soft and indefensible, susceptible to the

GRAPTA II.

slightest injury, and for a few moments the several parts of the future butterfly may be seen and readily separated; the wings folded close and enveloping the thorax, the antennæ and proboscis stretched at length along the back. But very speedily a complete casing is formed by the exuding from parts of the body of a viscous fluid, which binds together the tender parts, and covers the whole with a coating like varnish. This soon hardens, and the chrysalis is ready to take its chance against injury.

The chrysalis of *Comma* is grey or brown of two or three shades, with golden protuberances upon the abdomen, and with prominent eye and palpi covers and a sharp projection at back of head. This state continues about eleven days. A few hours before the butterfly is to emerge the metallic spots lose their lustre and the skin changes to a dark color indicating its separation from the imago within. At length the covering of the head parts, the insect struggles to disengage its head and legs and then feebly crawls forth, seeking instinctively some object on which to fasten. The body, legs and antennæ are full sized on emerging from the chrysalis, but the wings are undeveloped, being no more than one fourth inch long, yet having their characteristic shape and showing distinctly, though in miniature, every marking and spot that will afterwards appear.

So soon as the insect has attained a support it rests quietly, while the surface of the body dries and the wings expand slowly in length and breadth, each little spot in its due proportion, till in course of half an hour they have reached their full size, but still hang nerveless and limp. By a gentle fanning motion the limpness disappears, the wing becomes thoroughly dry and the perfect butterfly is ready for flight.

In habits *Comma* is extremely alert and restless, flying swiftly and for short distances only. It frequents the roads, especially in damp places, or collects in considerable numbers on the sides of the creeks or upon damp stones by the forest brook, not in clusters, as is the habit with many butterflies, but scattered about in close neighborhood with wings outspread to receive the full benefit of the sun. In the Catskills it is in company with *Faunus*, on the Kanawha River with *Fabricii* and *Interrogationis*, but greatly outnumbering these last.

The heavy frosts of November drive them into winter quarters and seeking out holes in trees, or crevices in rocks, they pass the season in a dormant state ready to reappear with the first warm breath of spring. But a very small proportion however survive as they are exposed in their defenseless state to attacks from many enemies. During the spring a few solitary individuals, faded and broken, are on the wing, and soon after the young leaves of the hop begin to show themselves the females are hovering about intent on depositing their eggs.

GRAPTA II.

NOTE.—*Comma* was considered by Dr. Fitch as identical with the European *Calbum*. He says, "This species is common to both sides of the Atlantic. Dr. Harris regarded our American insect as different from the European and accordingly named it *Comma*. He supposed the wings in the former to be more deeply indented and that specimens from the two continents could be at once distinguished by this mark. But how fallacious this character is will appear from the remark of Mr. Westwood, Humphreys' British Butterflies, page 50, who observes, 'This species is subject to an extraordinary variation in the form of its wings. In some specimens the incision in the hind margin of the fore-wings is so deep that it forms nearly a semi-circle, whilst in others it is scarcely more than a sextant, the other indentations being equally varied.' The American specimens vary in same manner. On comparing them on the one hand with the descriptions which European authors give of *Calbum*, and on the other with the description which Dr. Harris gives of *Comma*, every one must admit that of the two the former is plainly the species to which our insect pertains."

I have also been assured by both Dr. Staudinger and Mr. Müschler, since the publication of my plate of *Faunus*. that, beyond all question, *Faunus* is neither more or less than *Calbum*.

I thought it well therefore to enclose to Dr. Staudinger a male and female *Comma* from West Virginia and a male *Satyrus* from the Rocky Mountains, without names, for his determination. He replies, 5th June, (1871) "*As to the three individuals of Grapta Faunus, which have arrived in recognisable condition, I do not doubt for an instant that they are Grapta (Papilio) Calbum, L., although a very little modified so that one might retain the name of Faunus as that of a race or variety. The form of your hemisphere is distinguished principally by the hind wings being a little less excised and by the border of the wings being blacker; at least to judge by these three individuals, (which alone I know apart from your figures). But this individual from the Rocky Mountains is more unmistakable, and approaches our European and Siberian form nearer than the two from West Virginia. I repeat that your fauna agrees marvellously with the European.*" (The italics are mine.)

Now *Faunus* on the one hand, and *Comma* and *Satyrus* on the other, belong to distinct sub-groups, the latter being allied to *Interrogationis*, and it becomes a matter of interest to know that one European species exists so similar to both as to deceive practiced observers.

I have taken pains to bring together a number of specimens of the European *Calbum*, many of which were sent me by Mr. H. W. Bates, expressly to show the widest variation, and I have consulted authors within my reach who describe and figure the species and its larvæ. It certainly is very variable, and bears a resemblance in its several phases to at least these three American species, *Comma*, *Faunus*, and *Satyrus*, Edw., (the last not yet figured, but brought from California and Rocky Mountains.) *Calbum* also exhibits several phases that are not imitated by any yet known American species.

Some individuals are deeply incised and indented after the peculiar manner of *Faunus*, and have much resemblance on both surfaces to that species. (This

GRAPTA 11.

type is figured in Esper, Eur. Schmett. I, pl. 59.) But *Faunus* is notably larger, is deeper fulvous by many degrees, and has a much broader border to the hind margin of primaries. This border is deep black, not ferruginous, even edged within and never crenated as is often the case with *Calbum*. The spots are also intense black. The outer half of secondaries is black enclosing simply a few submarginal yellowish points. In *Calbum* this part of the wing is ferruginous and the yellowish points are much enlarged, often into patches that form a connected band across the wing, breaking up what otherwise would be the anterior portion of the ferruginous border into spots; thus giving the wing a macular appearance never found in *Faunus*, nor in *Comma* but paralleled in *Satyrus*.

The under side of those individuals of *Calbum* that in any way approach *Faunus* is cast in the same general pattern with that species, but the colors are different and the marbling much less decided. The basal shade is a dull red-brown varied by lighter brown; the marginal border is of the same dull color and the intermediate or mesial space is grey brown. *Faunus* has all the colors intense, the basal shade black brown, as is also the marginal border, and the intermediate space pale brown mottled with grey which becomes conspicuously white on the subapical patch. The whole surface is suffused with vinous and the general effect of this marbling and coloration is far more beautiful than can well be described or than can be imitated at all successfully. No *Calbum* is at all comparable to *Faunus* in these respects. The under side of *Calbum* is described by Mr. Westwood, in the work before cited, as "greyish ashen" and by Mr. Stainton as "dusky brown." The marginal row of metallic spots in *Faunus* is sometimes blue-black, sometimes green, those of *Calbum* are green.

Other specimens of *Calbum* are like *Comma* in the form of the wings and extent of indentation, as well as general appearance of both surfaces. (For this phase see Esper, I, pl. 13.) But without giving further details as to the differences between these two, *Comma* presents one character that is decisive. Instead of marginal green spots, in *Comma* these are blue and anterior to them is a common row of black points as in *Interrogationis*. Other specimens of *Calbum*, as has been said, resemble *Satyrus* in the macular upper surface, but this species partakes of the same peculiarities beneath, mentioned as distinguishing *Comma*.

Besides these resemblances many males of *Calbum* have the whole under surface suffused with shades of yellow, from pale to ochraceous, a feature as yet found in no American species.

The females *Calbum* differ still more decidedly from the females of the three species, yellow being often a prevailing tint of the under surface.

Before describing *Faunus*, in 1862, I enclosed specimens to Mr. Stainton and requested him to compare them with *Calbum*. The following was his reply. "Lewisham near London, 10th Feb. 1862. I have carefully examined the butterflies enclosed in your letter and have compared them with American specimens in the collection of the British Museum. No. 2 (*Faunus*) is a distinct, unnamed species, which in the List of Lepidoptera in B. M., Part 1, 1844, follows *V. Progne* as *Vanessa*—? from Martins Falls, Albany River, Hudson's Bay."

Unfortunately the larva of *Faunus* is still unknown. But those of *Comma*

GRAPTA II.

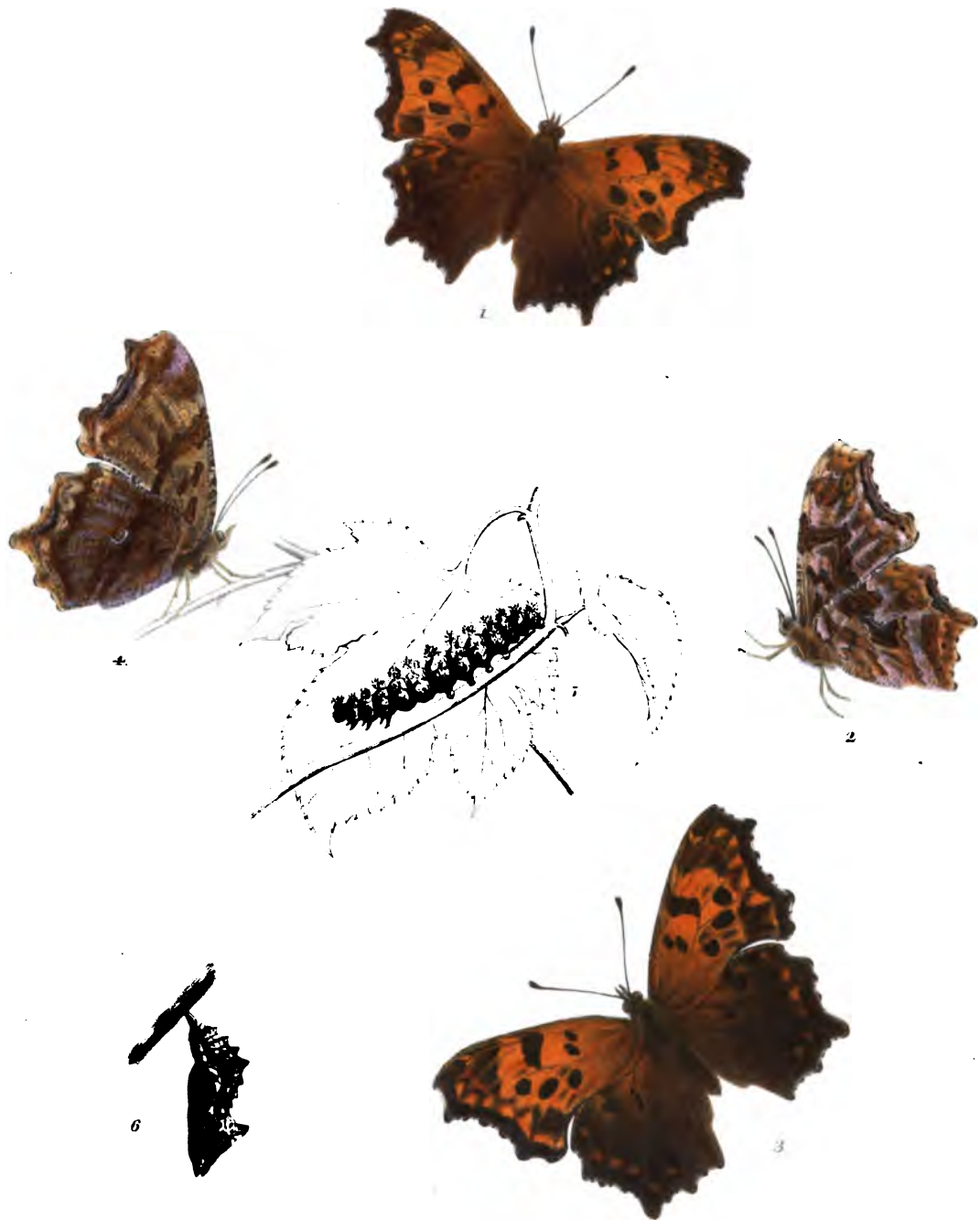
and *Satyrus* are known and settle the question of identity between either of these species and *Calbum*. The larva of *Comma* is illustrated in our plate. That of *Satyrus* is described by Mr. R. H. Stretch, as "dead black with a greenish white dorsal band from third to last segment," and he has furnished me with an admirable drawing which justifies his description.

On the other hand the larva of *Calbum* is described by Mr. Westwood as being "of a brownish red color, the back being reddish in front with the hinder part white," and the accompanying plate represents the first six segments as red, the remainder white, and is altogether quite unlike any known American species.

Neither *Faunus* nor *Comma* are subject to any wide variation, as I can assert from a long familiarity with both species, nor do the specimens of *Satyrus* that I have seen, numbering perhaps twenty, vary to any greater degree. On the other hand, *Calbum* varies so as to resemble not only these three distinct species, but has an overplus of variation sufficient to include resemblances to as many more. Unquestionably these several species and all others of the genus have sprung from one ancient form which may not unlikely have been near one of the many phases of the present *Calbum*. But one variety after another became permanent, each throwing off new varieties of its own, in time also to become permanent, till now we have many groups all allied but all distinctly separated. We have in North America at least nine well marked species of *Grapta* divisible into four groups, namely, that of *Progne*, of *Silenus*, of *Comma* and of *Faunus*.

There is a difference of opinion about the value of this genus, many European lepidopterists considering it not properly separable from *Vanessa*. But if "the co-descendants of the same form must be kept together in one group separate from the co-descendants of any other form," (Darwin's *Descent*, 1 p. 181.) then no genus is better founded than *Grapta*. The several species differ decidedly from the true *Vanessans* not only in the shape of the wings, but so far as is known in the preparatory stages. The larvæ are solitary, not gregarious, as are the true *Vanessans*. This difference of itself is generic and there could be no surer token of distinct ancestry.

GRAPTA.
III.



Described by Mary Peart.

From the collection of the British Museum.

DRYAS. 1. 2. 3. 4. ♀ 5. LARVA 6. CHRYSALIS.

GRAPTA III.

GRAPTA DRYAS. 1—6.

Grapta Dryas, Edwards, Trans. Am. Ent. Soc. 1870.

MALE. Expands 2.4 inches.

Primaries moderately incised; hind margins slightly dentated; a broad tail of medium length on middle of secondaries.

Upper side yellow fulvous marked with black and ferruginous as in *Comma* and *Interrogationis*; secondaries almost wholly black as in the latter species, the black shade gradually passing into fulvous near base; three fulvous sub-marginal points or spots at outer angle; a black patch on costa and spot in cell, in some cases only distinguished by a deeper shade than the ground color; fringes white in the emarginations, fuscous at tips of nervules.

Under side marbled in shades of grey, brown, ferruginous, olivaceous and honey yellow; more or less suffused with lilaceous and throughout densely covered with fine, abbreviated streaks of ferruginous; the basal space limited without by an irregular deep brown or ferruginous common discal band; in cell three distinct brown spots; the extra basal space lilaceous on both wings but on secondaries mixed with yellow and olivaceous; beyond, to margins, primaries partly yellow, partly clear yellow, the latter color at apex and inner angle; secondaries have a large, nebulous, ferruginous or olivaceous patch near outer angle and a nebulous curved stripe of similar color from median nervure to anal angle, the former enclosing on costal edge a yellow spot; both wings crossed by a conspicuous sub-marginal row of black points or small spots; on primaries a sub-apical ferruginous patch enclosing a lilaceous spot on costa; the incision edged by a brown line which is preceded by metallic grey, or blue-grey lunules edged with black; similar lunules on secondaries; costal edge of primaries lilaceous and buff, crossed to the nervure by ferruginous streaks and spots; silver spot an open C, large, narrow, thickened at extremities, sometimes interrupted on the lower side.

Body above fulvous covered with greenish hairs; below pale vinous brown; legs buff; palpi buff below, ferruginous above and at tip; club black, tipped with ferruginous.

FEMALE. Expands 2.6 inches.

Hind margin of primaries a little less incised; the dentations as in male. Upper side similar to male; under side honey yellow densely covered with ferru-

GRAPTA III.

ginous streaks; the pattern of markings as in male but faint and nearly lost in the ground color; some individuals light, the yellow predominating; in others the ferruginous streaks give color to the whole surface; sub-marginal black spots less conspicuous, and sometimes on disc of primaries wanting; marginal lunules as in male but less distinct; silver spot as in male, but sometimes a mere line not thickened at extremities.

MATURE LARVA. Length 1.25 inch. Color pale green marked with greenish white at the base of each spine with lines of same color across each segment; head dull pink covered with short spines and having at upper angle on each side a large branching spine pink at base, black at tip; a black patch on either side of face; mandibles black; body furnished with seven rows of many branching yellow spines, each branch tipped with black; under side green; legs reddish brown, prolegs green; spiracles black; on the 8th to 11th segments inclusive an orange spot immediately anterior to each spiracle.

CHRYSLIS delicate white, not much clouded, the wing cases and whole front having a sheen of bronze; the abdominal tubercles bronze. Or the general color is pale brown, clouded with darker shades, not metallic except on the tubercles; the palpi cases are long and sharp, and the prominence on back of head is pointed. In size and general form the chrysalis resembles that of *Comma*.

I have occasionally taken this species at Coalburgh, W. Va. and in the Catskill Mountains and was formerly inclined to regard it as a variety of either *Comma* or *Interrogationis*. During the season of 1870 I was fortunate in obtaining two of its larvæ and from them the butterflies. They were feeding on the hop, in July, and in habit resembled the larvæ of *Comma*, remaining concealed on the under side of a folded leaf, and eating from the outer extremity so long as enough remained to afford protection. These larvæ were nearly mature and shortly after changed to chrysalids. In this state they continued ten days and yielded one male and one female butterfly, the white chrysalis producing the female.

This species is between *Comma* and *Interrogationis*. The shape is that of the latter as is also the shade of color of upper side. On the under side of the male the markings are rather nearer *Comma* but with a difference in coloration. The under side of the female differs materially from that of either species.

NOTE.—While the foregoing description was passing through the press, between the 10th and 18th May (1871), I took eight larvæ of *Dryas* from the hop, from half grown to mature. The younger ones were dull white, with an interrupted supra-stigmatal blackish line; as they approached maturity this disappeared and the color changed to green. Between 20th May and 2nd June emerged 6 ♂, 1 ♀.

GRAPHNAE
IV.



Drawn by Mary Peart

L. Bowen. lith Phila.

INTERROGATIONIS VAR. UMBROSA 12 83. 4. 9.

a. Egg, nat. size b. Eggs magnified.
c. Young larva, d. Same after first moult.
e. Same after second moult, f. Mature larva.
g. Chrysalis.

GRAPTA IV.

GRAPTA INTERROGATIONIS.

Grapta Interrogationis, Fabricius.

Var. *Umbrosa*, Lintner, Trans. Am. Ent. Soc. 1869, p. 313; 1870, p. 197.

Interrogationis, Fabr. ♀, Suppl. p. 424. Godart, Enc. Meth. IX, p. 302. Harris, Ins. Mass. Ed. 1852, p. 298, (text, not plate.)

C aureum, Cramer, ♂, pl. 19. Fab. ♂, Sp. Ins. p. 94; Ent. Syst. p. 78. Abbot & Smith, ♂.

Ins. Ga. pl. 11. Hübner, Exot. Schmett. II, ♂ ♀. Bois. & Lec. ♂, pl. 51.

Var. *Fabricii*, Edwards, Trans. Am. Ent. Soc. 1870, p. 5.

Interrogationis, Harris, ♀, Ins. Mass. Ed. 1852, plate. Lintner, Trans. Am. Ent. Soc. 1869, p. 315, 1870, p. 197.

INTERROGATIONIS, VAR. UMBROSA.

Form alike in both sexes, primaries slightly falcated, little excised; tail prominent, broad at base, tapering; anal angle slightly or not at all produced.

MALE. Expands 2.6 inches.

Upper side fulvous, marked and spotted with black; primaries have a broad, black marginal border, somewhat suffused with ferruginous at the upper part of the incision on hind margin and next inner angle; upon the disk five rounded spots disposed in a right angle, the two smallest being in cell and the others in the interspaces; between the lower two of these last, transverse to them, two small spots or patches of scales; another in lower discoidal interspace, and a large subquadrate spot from the costa covering the arc; next the marginal border on costa a large patch suffused with ferruginous and a smaller one on inner margin. Secondaries have the outer two-thirds overlaid with black, most dense behind the cell, but towards outer angle and on disk showing the fulvous sub-color, into which the black shade gradually fades and disappears towards base; on costal margin a deep black duplex spot, and a small spot on arc; tail ashy-grey, marginal border lightly touched with same hue, and sometimes the tips of the nervules on primaries; fringes white in the emarginations, fuscous at the nervules.

Under side variegated with ferruginous, brown, olivaceous and more or less suffused with purple; the basal third limited by an irregular ferruginous, partly olivaceous band, within which the ground is yellow-brown streaked with ferruginous; outside the band, primaries have a narrow belt of yellow-brown, beyond which the colors are brown and olivaceous; a lilac patch near inner angle, and a large sub-apical one on costa enclosing a patch of whitish; secondaries olivaceous

GRAPTA IV.

on costal margin and along the whole hind margin, except just over the tail, where the tint is lilaceous; the rest of the limb suffused with purple; commencing at the upper sub-costal nervule a deep ferruginous patch extends to median and is continued in a broad, curved, posteriorly attenuated stripe to anal angle; crossing both wings is a row of black points, on secondaries lying within the ferruginous stripe, each having a faint olivaceous halo; along the incision of primaries a series of metallic blue or green streaks or narrow lunules; on secondaries these are large and distinctly lunular; discal mark on secondaries an interrupted C, usually silvered, but at times aureous; costal edge of primaries crossed to sub-costal nervule by ferruginous streaks and patches, between which the ground color is buff.

Body above fulvous, covered on thorax with green hairs; beneath grey-ferruginous; legs buff; palpi buff, on upper side fulvous; antennæ fuscous above, annulated below with buff; club fulvous tipped with buff.

FEMALE.—Expands 3 inches.

Upper side similar to male; fringes similar.

Under side brown suffused with blue-grey; the hind margin of primaries olive-brown; on secondaries the sub-marginal stripe and patch but faintly indicated; the metallic spots less distinct than in male and more or less wanting; the common row of black points conspicuous.

Egg .02 in diameter; smooth, spherical, flattened at top and slightly at base; from the centre of the base proceed ten narrow ribs, at first scarcely raised above the surface, increasing gradually in prominence as they ascend, and terminating abruptly and perpendicularly at the rim of the flattened top, marked on either side by transverse parallel grooves; (see plate). Color pale green.

The larvæ emerge from the egg in from three to four days. At first, they are one-tenth inch in length, translucent, greenish, covered with hairs; the head large, bilobed, black. In a few hours they change to black. After first moult, (length .3 inch) which takes place in about two days, they are black, more or less specked with white, and begin to be clothed with short spines, all black except those on eighth and tenth segments, which are whitish. After another interval of two days the second moult takes place (length .4 inch), and the larvæ begin to assume the type that they retain to maturity. The spines are in seven rows, one dorsal, two lateral on each side and one infra-stigmatal, fleshy at base, slender and many-branching at extremity; the dorsal and first lateral on third segment are black, on second, fourth and eleventh, russet, the rest yellow; the second laterals black throughout, the lowest row greenish; head bilobed, black, with short black spines at vertices.

GRAPTA IV.

After third moult (length .6 inch), which takes place two days later, the spines are greatly enlarged and lengthened. In from two to three days further (length .9 inch), the fourth and last moult occurs. From the third moult the larvæ vary greatly, both in color of body and of spines. Some are black, finely specked with yellowish; others are yellow-brown, specked with yellow tubercles; others grey-brown with indistinct reddish lines between the spines on the dorsal and two lateral rows and much tuberculated; others are black with fulvous stripes and profusely covered with yellowish tuberculated spots and points. The colors of the spines vary from black to fulvous and green and yellow. From four to five days after the last moult, the length having increased to 1.6 inch, the larva stops feeding and within twenty-four hours changes to chrysalis. Duration of the larval state about fifteen days.

The chrysalids vary slightly in color, being in shades of brown clouded with olivaceous or lilac; sometimes a dark green stripe from the tail along the spiracles as far as the wing cases; in all, the surface is somewhat bronzed and decidedly on back of head and on the abdominal tubercles, excepting the four middle ones which are silvered; palpi cases prominent, and mesonotal process prominent, arched and thin. Duration of chrysalis state eleven days.

GRAPTA. V.



Drawn by Mary Fearn

T. Sinclair del. & sculp.

INTERROGATIONIS VAR. FABRICII, 1, 2 ♂, 3, 4 ♀.
5. Larva.
6. Chrysalis.

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INTERROGATIONIS, VAR. FABRICII.

Form alike in both sexes; primaries strongly falcated, much excised; tail longer, narrower, less tapering than in *Umbrosa*; anal angle much produced.

MALE.—Expands 2.5 to 2.7 inches.

Upper side bright red-fulvous, the terminal third of primaries and whole of secondaries obscured by ferruginous; spots as in *Umbrosa*; hind margins of both wings and abdominal margin at the fold largely edged with lilac; fringes fuscous.

Under side clouded in shades of brown and ferruginous, sometimes partially suffused by purple; the general pattern as in *Umbrosa*, without the striking diversity of color; the common row of black points more or less obsolete; costal edge of primaries ferruginous beaded by small round yellow spots, between which and the sub-costal nervure the ground is yellow specked with ferruginous; silver mark as in *Umbrosa*.

FEMALE.—Expands 3 inches.

Upper side similar to male; under side brown suffused with ochraceous, deeply along hind margin; sometimes partially suffused with purplish instead of ochraceous; the whole surface covered with fine abbreviated ferruginous streaks; the common row of black points obsolete, or represented by two or three at outer angle and apex only, and always minute.

These varieties differ in shape of wings, in comparative breadth and length of the tail, in the prominence of anal angle; in both sexes in the color of upper surface, in that of the marginal edges, and of the fringes; in the color of under surface and in the relative position and extent of the yellow and ferruginous markings of the costal margin of primaries. These differences are conspicuous and constant, there being, so far as I know, no intergrades.

Until the publication of Mr. Lintner's paper of 1869, these two forms had been treated by late authors as one species, one or the other, or the sexes of either, being described as *C. aureum* or *Interrogationis* indifferently. Judging by the imago alone each was entitled to rank as a species, as they presented constant differences in essential characters and Mr. Lintner very properly separated them. But believing that the darker species did not fall within the Fabrician descriptions, he applied to it the name *Umbrosa*.

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It appeared to me that Fabricius had described the female of this *Umbrosa* as *Interrogationis*, and that the only doubtful point was whether he had described the corresponding male, or either sex of the other species, as *C aureum*. But inasmuch as the name *C aureum* was pre-occupied, that subsequently given to the female must extend to its male, and the other species whether really described by Fabricius or not, should be regarded as unnamed. I therefore proposed for it the name *Fabricii*.

As is well known, the larvæ that produce these two forms are remarkably variable. For several years I had endeavored to ascertain which type of larva produced either species of imago or the sexes of either, but with no satisfactory result, inasmuch as when I thought the matter determined by one series of observations, the next perhaps would unsettle everything.

On the 4th June, of this present year, (1871) I noticed two females *Umbrosa* flying about the hop-vines near my house, at Coalburgh, and had no difficulty in capturing them. I enclosed them in a keg over a branch of the vine, covering with a cloth. On the 6th, a large number of eggs had been laid, a few of which were on the upper leaves of the vine, but the greater part on the cloth. On the 9th, they were hatching and I removed the larvæ to the house and enclosed in a breeding-cage. From these I obtained 18 chrysalids, which produced, on 3d July and subsequent days, 11 *Umbrosa*, 5 ♂, 6 ♀, and 6 *Fabricii*, 1 ♂, 5 ♀.

On the 29th July, and successive days till 5th August, I took eleven females of same type, no others being seen, and enclosed in same way as before. From these I obtained hundreds of eggs, and separated the larvæ therefrom into three lots, one comprising those hatched from eggs laid on the cloths, one from a large cluster laid on a single leaf, and all others in the third. By 3d September many imagos had appeared. From the eggs on cloth resulted 49, of which 29 were *Umbrosa*, 14 ♂, 15 ♀, and 20 *Fabricii*, 11 ♂, 9 ♀. From the leaf 8 *Umbrosa*, 5 ♂, 3 ♀, and 6 *Fabricii*, 4 ♂, 2 ♀, and from the remainder 26 *Umbrosa*, 14 ♂, 12 ♀, and 8 *Fabricii*, 6 ♂, 2 ♀.

In each lot of larvæ all the different types of coloration known to me were represented, and there certainly is no connection between either of them and the varieties or sexes of the imagos.

These forms therefore are but one species, and so far it would appear that the darker of the two was the type and the other a variety. But although I have not been able to obtain females of *Fabricii*, and to determine this point absolutely, yet from the fact that the two forms are invariably found together, even where, as in many districts, *Fabricii* greatly out numbers *Umbrosa*, and from the analogous case of *Ajax*, I believe that the eggs of *Fabricii* will also produce both types of imago. If this be so neither can be considered as a variety of the

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other. They are dimorphic forms of *Interrogationis*, and to distinguish them from ordinary varieties, I have given them both specific names, indicating their relationship.

(Since discovering the dimorphism of *Interrogationis*, I incline to think *Graptas Comma* and *Dryas* will prove to be but one species also. The case would not however be strictly parallel with *Interrogationis*, but might prove to be a modification of seasonal dimorphism. I obtained in May, of this year, seven specimens of *Dryas*, and all that I have before seen have been bred or taken in the early part of the season. at the same time with *Comma*, while from great numbers of the larvæ obtained in the Autumn I have had nothing but *Comma*. The early brood only therefore may prove to be dimorphic).

Interrogationis is abundant over the whole eastern part of the United States and in Canada. How far west it is found I am unable to say, certainly however, as far as Iowa, and from Missouri to Texas. But it has not been found in Colorado by Mr. Mead, who has collected extensively in that State. In West Virginia, I have found the variety *Umbrosa* the most common, but in the Catskill Mountains the proportions were reversed. Mr. Lintner states that the results of his collecting in Middle New York show the greater abundance also of the variety *Fabricii*. On the other hand, Dr. Harris says, that in Massachusetts, the male "is often black-winged," meaning *Umbrosa*. The southern specimens are larger than those from the north, differing one-half inch in expanse of wing.

The larvæ feed upon the hop, elm, nettle, false-nettle, (*Boehmeria*) and, at Coalburgh, may usually be found in different stages of growth from about 20th May till September. I have frequently seen several females at once flying in and out my hop-vines, alighting on the ends of the shoots or on the tender leaves to deposit their eggs. The butterflies are then always battered and worn, evidently a long period having elapsed since they emerged from chrysalis. The eggs are usually laid singly, but sometimes three or four may be seen on the same leaf. Two or more may also occasionally be found standing one on end of the other perpendicular to the surface of the leaf, and I have seen four, five and as many as eight in one stalk (see plate) The larvæ are easily raised in confinement and will submit to a change of food, as from hop to *Boehmeria*, without the slightest hesitancy. Like its congeners this species hibernates and appears in the early Spring.

When it is considered how many eggs are laid, and that so short a time intervenes between the egg and the imago, it is surprising how few butterflies of this species are the result. From eggs that were laid on my vines in July and August, amounting, I am sure, to many hundreds, very few larvæ were hatched, and gradually these became more and more scarce. so that at last I could with difficulty dis-

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cover a single one. The eggs are destroyed by spiders and various insects by wholesale. I have had the contents of one of my kegs swept away in a night, leaving not a trace of shell behind, and in same way I have lost scores of small larvæ. The only safe mode of securing them is to transfer the larvæ as soon as hatched to the house. Finally, after the larvæ have escaped all apparent danger and have changed to chrysalids, the imago therein is often destroyed by ichneumon-flies. So that it is doubtful if much more than two per cent of the eggs laid produce butterflies. The perils of the winter destroy nearly all the last brood, and in the Spring but few of the butterflies are to be seen. They become more plenty as the successive broods appear, but, one season with another, the number seems to be about the same.

NOTE.—The first mention of a *Papilio C aureum* is in Linnæus, Syst. Nat. 1760, I, p. 477, as follows. "*C aureum*, P. N. alis angulatis fulvis nigro maculatis; posticis subtus *C aureo* notatis. Habitat in Asia."

This species is now recognized as equivalent to *Angelica*, Cramer, pl. 388, an Asiatic species found in India and Japan, materially differing from any American *Grapta*.

In 1775, Fabricius, Syst. Ent. page 506, describes *C aureum* nearly in same words, viz: "*P. alis dentato-caudatis, fulvis, nigro-maculatis; posticis subtus C aureo* notatis. Habitat in Asia," and refers to Linnæus.

In 1781, Fabricius, Sp. Ins. II, p. 94, again describes *C aureum* in same words, with same reference to Linnæus and habitat, but refers also to Cramer, II, pl. 19, fig. E. F. Cramer's figures purport to represent an American species, which may properly be considered as the one had in view by Fabricius, although there was error in his reference to Linnæus and in his habitat, caused naturally by the vague description of Linnæus.

I am satisfied that Cramer's figures are intended to represent *Umbrosa* ♂, though the execution is wretched. Mr Scudder conjectured that they might have been taken from a third species possibly to be found in the Southern States and West Indies, and he proposed for this the name *Cramerii*. But I think the difficulty is altogether with the artist.

In 1797, Abbot (Insects of Georgia) figured, without description, as *C aureum* the male *Umbrosa*.

In 1798, Fabricius (Supp't p. 424), for the first time mentions and describes *P. Interrogationis*, viz; "*alis caudatis fulvis nigro maculatis, subtus glaucis: striga punctorum nigrorum*, posticis *C aureo* notatis.

Habitat in America boreali.

Nimis affinis *P. C aureo* at paullo major et alæ subtus glaucæ striga punctorum nigrorum."

Wings tailed, fulvous spotted with black, beneath glaucous (i. e. a blue or green inclining to grey or white) with a transverse band (*striga*) of black points. * * * * Extremely like *P. C aureum* but a little larger and the wings beneath glaucous with a transverse band of black points.

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This description applies well to the female *Umbrosa*, which alone of the sexes of either form can be called glaucous, this word expressing the blue-grey color with which the wings are suffused. It is not often used by Fabricius. In his Ent. Syst. I have been able to discover it but few times. One of these is used in describing the American species, *Megistanis Acheronta*, the under side of which is a shade of grey that nearly approaches the female *Umbrosa*. This latter is also distinguished by a row of distinct black points crossing both wings.

I conclude therefore that the female *Umbrosa* is the true *Interrogationis*, Fab. This was the opinion of Godart. In Enc. Meth. IX, p. 302. he says; "Fabricius has taken the male for *C aureum* of Linnæus and has made of the female a separate species under the name of *Interrogationis*."

Boisduval and Leconte give a figure copied from one of Abbot's drawings, composed apparently of the upper surface of *Fabricii* and the under surface of *Umbrosa*. The shape is rather that of the latter. These authors state that although there would seem to be more than one species, yet as the caterpillars are the same, the butterflies must be the same also. A correct conclusion from incorrect premises, for it is not implied that caterpillars had been proved to be the same by breeding from the egg, and resemblance in the larvæ by no means indicates identity in the imago.

The figures of Hübner are admirable, and represent both sexes of *Umbrosa*, under the name *C aureum*. I do not find *Fabricii* anywhere figured except in the wood-cut of the female in Harris.

The history of *Interrogationis*, and that of *Ajax*, illustrates the defects of the present system of determining genera and species, founded as it is on one stage only of the insect's existence, and omitting the other three, the egg, larva and chrysalis, from consideration. Certainly all these stages are important, if not equally so, to a true conception of either genus or species. Even so minute objects as the eggs of butterflies, sometimes scarcely to be distinguished by the naked eye, and always requiring examination under the microscope, are found to differ generically in shape and ornamentation as decidedly as do the butterflies produced from them. Nothing can be more distinct than the smooth, spherical egg of *Papilio*, the granulated, lenticular egg of *Parnassius*, the fusiform of *Pieris*, the ribbed ovoid of *Vanessa*, the sculptured conoid of *Argynnis*, the dome-topped cylinder of *Danais*, or the semi-sphere of *Pamphila*. And so far as I have been able to examine the eggs of our butterflies, those of the same genus, besides bearing a generic resemblance, have each their specific differences. Thus *Ajax* is distinguishable from *Turnus*, or *Troilus*, or *Philenor*; *Philodice* from *Eurytheme*, or *Alexandra*. So with *Diana*, *Cybele*, *Aphrodite*, and the *Satyri* and *Hesperidæ*.

The larvæ and chrysalids also fall naturally into groups, or in other words differ generically, though genera founded upon these groupings would disarrange very materially many of the highly artificial divisions at present recognised. And they differ individually so that one need never be mistaken for another, even in such cases of similarity as in the larvæ of *L. Disippus* and *L. Ursula*.

But, inasmuch as the imago is the only one of the four stages that is usually known, the determining characters are sought in it alone, in the distribution of the nervures, in peculiarities of legs, palpi and antennæ, form of wings and markings

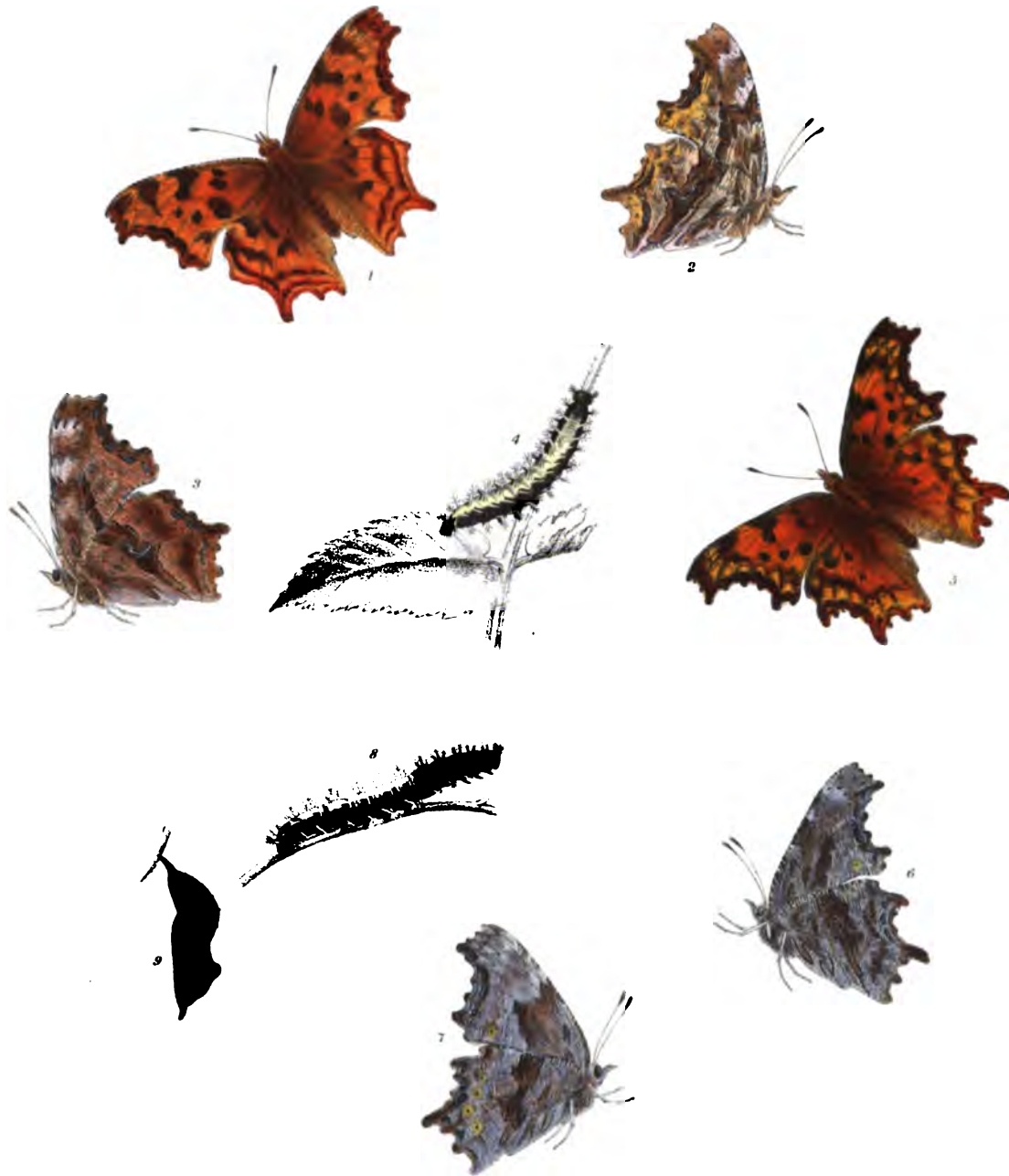
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or coloration. Nearly all these are generic, that is, they belong to all the members of a group, and the last two only, markings and coloration, are relied on for separating species. These are always variable, and to distinguish between essential and non-essential variations is often very much a matter of individual judgment where one may be right or wrong and where opinions will differ. Many species are distinct beyond all doubt, but very often one form runs into another, or seems to branch from another, or several seem to be intermediate between two that are themselves distinct. To determine therefore which of these is a good species, and which is a variety, is difficult and almost always unsatisfactory. So in this uncertainty some naturalists name as distinct every form that presents differences that are tangible enough to be described intelligibly, while others rest upon the broad and comfortable ground that closely allied, or even tolerably distinct, forms in which there can be shown intergrades, are to be classed as a species and its varieties. Notwithstanding, it is certain that, among the butterflies, the preparatory stages of such allied forms are often found to be abundantly distinct, as in the case of the Graptas *Calbum*, *Satyrus* and *Comma*, all of which, judging by the imago alone, might be considered as one species, and indeed have been by expert lepidopterists. Yet, the larvæ of all of them being known, they are shown to be not merely distinct species but separated by a much wider interval than are many others. On the other hand, and exactly the reverse of this, imagos undeniably distinct may prove to be but one and the same species, as in the case of the two varieties of *Interrogationis* and the three of *Ajax*.

No doubt very many of the present names of species of butterflies are to be regarded as provisional, always subject to rectification. But before the first step can be taken towards correct knowledge, differing forms of imago must be distinguished by name so as to be recognised and their study facilitated, instead of being thrown together indiscriminately, and lost sight of as varieties of this or that species, when in most cases absolutely nothing is known about them, and any opinion is, at best, but guess-work. But when such forms are found by breeding from the egg to be only varieties, they will take their proper places in the Catalogues and yet lose nothing of interest, and will help to form the material by which the naturalists of the happy future will read clearly the riddles that as yet perplex us.

GRAPTA.

VI.



Drawn by Mary Peart

L. Bowen, lith. Phila.

SATYRUS. 1. 2. ♂; 3. ♀; 4. LARVA.

ZEPHYRUS. 5. 6. ♂; 7. ♀; 8. LARVA; 9. CHRYSALIS.

GRAPTA VI.

GRAPTA SATYRUS.

Grapta Satyrus, (Sat'-y-rus) Edwards, Trans. Am. Ent. Soc. 1870.

MALE.—Expands 2 inches.

Primaries moderately incised and dentated; tail long, tapering; anal angle produced.

Upper side uniform yellow-fulvous, dusky at base, and spotted with blackish brown; marginal borders narrow, often obsolete next margin, so that but a line or stripe of brown remains within; a large subapical spot on costal margin of primaries, and a second covering the arc, sub-rectangular, dilated on costa; other spots as in *Comma* and allied species; marginal border of secondaries preceded by a series of irregular pale brown or ferruginous patches, usually more or less obsolete, but sometimes crossing the entire wing; a large blackish spot on middle of costal margin, another in cell, the two often confluent, and a small spot at origin of the upper median nervules; fringes dark brown, white in the emarginations.

Under side marbled in shades of brown, more or less suffused with yellow; the basal area, occupying nearly half the wings, limited by a line that is angular on primaries, wavy in secondaries, as in *Comma*, on the inner side of which the shade of brown is darkest; in cell of primaries three elongated brown spots edged by darker lines, the extra basal space more or less tinted with yellow, much covered with fine, abbreviated, ferruginous streaks; apex of primaries yellow-brown, sometimes tinted with olivaceous, enclosing three ferruginous points and limited below by a ferruginous line running back from the angle of margin; sub-apical patch greyish-white; incision bordered by a broad band which anteriorly is black and encloses luteous lunules; secondaries have a similar but abbreviated border next above the tail, and posteriorly traces of such a border, obsolete; a sub-marginal ferruginous or olivaceous arc from anal angle to tail, and similar colored subapical patch; both wings crossed by an extra discal row of black dots, not complete except at the extremities; silver mark shaped like an inverted C, large, open, often very slender, barbed at lower extremity.

Body fulvous above, beneath either yellow-grey or vinous; legs pale buff, pro-legs vinous, with blackish stripe on front; palpi buff below, fulvous at tip; antennæ dark brown above, buff below; club black, buff at tip.

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FEMALE.—Same size.

Similar in form and on upper side similar in color and markings; beneath nearly uniform wood, or olivaceous brown, or vinous, with markings as in male, but indistinct and more or less obsolete; silver mark very slender and open, slightly barbed.

Found in the Rocky Mountains, in Colorado, and in California and Oregon.

I am indebted to R. H. Stretch, Esq., for the drawing of the larva, and the following description.

MATURE LARVA. Head black, angular, bilobed, spiny and with a spiny tubercle at each of the upper angles; color of body black with a broad, greenish-white dorsal stripe, which on the anterior segments is clouded with black; on each segment, on this stripe, is a fine V-shaped black mark having its angle at the dorsal spine; the spines form seven rows; the dorsal greenish-white, wanting on the first four segments; the first lateral row of same color, present on all segments from the second; the second lateral row black, the third greenish-white, wanting on the first four and terminal segments, and springing from an infra-stigmatal line of same color; all the spines are thinly covered with short, bristling, concolored hairs, except that those near the tips of the white spines are blackish.

Found on nettles, (*Urtica*) at Congress Springs, Santa Clara Co., California.

Mr. Henry Edwards also writes, San Francisco, 26th March 1872. "The larva No. 4 on your plate is same as one I raised last year, which produced the male I now send you (*Satyrus*). I had two others exactly like it, but they died before coming to maturity. Their food was the stinging nettle and I could not get any of this plant in the city to keep them alive. I mention this to show that the coloring of the larva is constant, as if the same in four individuals, it is pretty good proof that the likeness extends throughout the species."

Satyrus forms one of the remarkable group, the several members of which resemble one or other of the phases of *C album*, and to which I have referred in the notes to *Comma*. It as yet has nowhere been found common. Mr. Mead saw not more than half a dozen specimens in Colorado, where *Zephyrus* was abundant. I have also received it from the Island of San Juan, taken in company with *G. Silenus*.

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GRAPTA ZEPHYRUS.

Grapta Zephyrus (Zeph'-y-rus), Edwards, Trans. Am. Ent. Soc. 1870.

MALE.—Expands 1.8 to 2 inches.

Primaries deeply incised, moderately dentated; secondaries have posteriorly three prominent dentations, usually equal, sometimes the second produced; tail long, united at base with third dentation; outer angle strongly produced, and margin deeply incised.

Upper side fiery-red fulvous, fading into yellow fulvous on disk; primaries have a narrow fuscous border often suffused with ferruginous, preceded throughout by a series of elongated yellow lunules; the border of secondaries still narrower, often interrupted, sometimes ferruginous, and supporting large yellow lunules, which are rather indistinct in outline, and always confluent; primaries have a large subapical ferruginous patch, a smaller one near inner angle; a large black spot, depressed, covering the arc, frequently much dilated on costa; five small black spots arranged as in the allied species; secondaries have the outer limb more or less irrorated with ferruginous, forming a sort of band anterior to the yellow lunules; a large black patch on middle of costa and a small sub-triangular spot on arc, sometimes connected with the patch; fringes fuscous at tips of nervules and somewhat on the interspaces, mixed irregularly with yellow and white.

Under side grey-brown, but varying much in individuals, in some the grey shade predominating, giving a hoary appearance to the whole surface, others quite dark, but all densely covered with fine, abbreviated lines darker than the ground; the basal space is usually brown, limited on the disk by a moderately irregular outline, very closely as in *Gracilis* and *Progne*, well defined except against cell of primaries; in the cell three elongated brown spots edged with black, two being in line next sub-costal and the third against the space that is between the two others and next median; both wings have an extra-discal complete row of black points, edged by luteous scales, often conspicuously, except those on costal margin of primaries which are edged anteriorly by small pure white lunations; three dark brown serrated spots at apex; the incision bordered by a cinereous, sometimes plumbaginous, wavy line, edged anteriorly by velvety black; on secondaries a similar line, but interrupted beyond the tail and frequently there obsolete; costal margin of primaries marked with irregular patches of dark brown and grey white; edge of inner margin of same wings and of costal of secondaries beaded with brown and white; discal silver spot narrow, bent at an angle of about fifty degrees, not barbed, but acuminate at either extremity, the limbs either of even length or the lower one shorter.

Body fulvous, beneath grey-brown; legs grey; palpi grey, blackish in front

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and at tip; antennæ brown annulated with whitish beneath; club black, yellow at tip.

FEMALE.—Same size.

Upper side less intense, margins more yellow; beneath lighter colored than most males, but similarly marked.

MATURE LARVA.—Length 1.5 inch.

Body furnished with six rows of many branching spines; head black, with short black spines at vertices; segments from second to eighth, both inclusive, bright buff inclining to orange; remaining segments pure white. Along the sides are two waved orange lines uniting irregularly; the interspaces, which are buff or white, according as they are anterior or posterior, are marked with black dots; above the orange lines are some faint black lines, and some black patches are discernible at the base of lateral spines; spiracles black, broadly bordered with white; under side dull flesh color; feet and pro-legs black with pinkish tinge.

CHRYsalis.—Length 1 inch.

Color brown, the general shape as in *Comma*, but the mesonotal process more prominent and rounded; the palpi cases more produced and compressed at base; the upper tubercles silvered.

To Mr. Henry Edwards I am indebted for the foregoing description of the larva and chrysalis, and to Mr. Stretch for the drawings reproduced on the plate. Mr. Edwards informs me that this larva was taken by him in July, 1871, in the Yo Semite Valley, and was feeding on *Azalia occidentalis*, a most unexpected food-plant for larvæ of *Grapta*. It was raised to maturity, the change to chrysalis occurring 29th of July, and the butterfly emerged 15th of August. The similarity of this larva to that of *C album* is remarkable, inasmuch as the butterflies belong to different groups of the genus, while the larvæ of *Comma* and *Satyrus*, which species in the imago resemble phases of *C album*, are wholly unlike the larva of the latter.

In the description of *Zephyrus*, I have spoken of the three elongated spots in cell of primaries on under surface. These are found, similar in shape and scarcely varying in position, in all the smaller *Graptas*. In *Progne* there are very rarely instances of same peculiarity, but almost invariably the two upper spots are united and produced so as to form a long, narrow band running from subcostal obliquely to median at base, and the third spot is produced in the same manner and runs parallel to the other. Out of numbers of *Graptas* of other species, I have found no instance of these parallel bands except in *Progne*. In the figure of *C Argenteum*, (synonymous with *Progne*) in Kirby's Fauna Bor. Amer. these stripes are well indicated.

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In *Grapta Interrogationis* there are also found three cellular spots, but different in shape and position from those before mentioned; one being sub-rhomboidal, depending from subcostal and running obliquely back to a point on a central line from base; just below this spot and a little anterior, and separated, starting from the central line, is another spot of nearly same shape that extends to median, the two forming a broken line; near base, running with the central line is the third spot, small, long oval. In *J album*, which should be classed with the Graptas, very much such an arrangement of the three spots occurs as in *Interrogationis*, but the two outer spots are connected at their angles on the central line, and the smaller one is much enlarged. In the true Vanessans there are also three cellular spots, but more widely differing still from those of the small Graptas. In *Antiopa* the lower spot is turned obliquely to the upper, the position of this last and the basal spot being much as in *Interrogationis*. In *Milbertii* the two outer spots are large and confluent forming a broad zigzag band across cell; the third spot does not run with the central line but crosses it obliquely from its origin on median near base. In *Californica* the arrangement is much as in *Milbertii*. Such features illustrate affinities, and also show how a genus becomes broken into groups with a tendency to further division.

Zephyrus was taken abundantly by Mr. Mead, during the month of August, 1871, in Colorado, and was found throughout the State wherever collections were made, frequently in company with a small species allied to *Faunus*, to which I have given the name of *Hylas*, and of *Vanessa Antiopa*. Mr. Mead writes, "On the 28th, on South Park road, in the mountains about twenty miles from the Park, I found a large, smooth rock, exposed to the sun, on which were several Graptas, *Zephyrus* and a species numbered three (*Hylas*). On this rock and in immediate vicinity I captured twenty *Zephyrus* and five of the other. I had previously, on the 16th, found both species together in the vicinity of Berthoud's Pass, where fifteen of the smaller one were taken with a few *Zephyrus*, on a small patch of flowers high up the mountain. These were the only occasions on which the small Grapta (*Hylas*) was seen." I have also received *Zephyrus* from Nevada, and from Fort Simpson, Mackenzies River.

LIMENITIS.

I.



Drawn by Mary Peart

Bowen & Co. Ltd. Phila.

PROSERPINA 12 6342

LIMENITIS I.

LIMENITIS PROSERPINA. 1—4.

Limenitis Proserpina, (Pros-er'-pi-na,) ♂, Edwards, Proc. Ent. Soc. Phila. 1865, p. 148; Trans. Amer. Ent. Soc. I, p. 286, 1867.

MALE. Expands 2.25 inches.

Upper side black, secondaries only having a slight bluish (occasionally greenish) tinge; hind margins of secondaries bordered by a double row of blue (or green) crescents; the submarginal row is continued on primaries, but is indistinct, almost obsolete; beyond the crescents, on secondaries, is a row of russet spots surmounted by blue (or green) scales, which are more or less conspicuous; in some specimens the russet spots are distinct across the whole wing, in some two or three only are seen, and in others they are altogether wanting; the blue scales or spots make a circular band across secondaries, and are continued across primaries with more or less distinctness (often becoming whitish) to the costa, and correspond with the white band of under surface; the contour of this band above is like that of *Arthemis*, and it terminates on the costa in a white streak; there is also a white subapical spot divided into two or three by the nervules; emarginations white.

Under side brown, varying in shade from blackish to russet, and in this respect and in markings remarkably like *Arthemis*, except that the white band of the latter is here always slight and sometimes partly wanting; both wings have a double row of blue (or green) crescents, preceded by a row of rounded russet spots, large on secondaries, and on these, edged above and below with black; the spot at inner angle of primaries is wanting; above the russet spots is a curved whitish band or streak, common to both wings, sometimes half the width of the band of *Arthemis*, but sometimes indicated by a few scales only above the russet spots; the subapical spot and costal streak of upper side repeated conspicuously; base of wings marked by russet spots edged with black; between these are metallic blue (or green) patches as in *Arthemis*.

Body below white; fore legs white; palpi white, edged with black; antennæ and club black, tipped with ferruginous.

FEMALE. Expands 2.5 inches. Similar in markings.

This fine species I first noticed in the Catskills, in 1863, when a single male in not very good condition was taken. In 1867, I found it abundant in the Stoney Clove and from 2nd to 4th July, took several fresh specimens. In the latter part of July and first ten days of August 1868, I saw many more, of both sexes, both

LIMENITIS I.

in Stoney Clove and upon the Clove road, south of the Mountain House, but all were much rubbed and broken. They should be sought for early in July in that region.

In the collection of Mr Charles Wilt, of Philadelphia, are two females, from one of which the figure in the plate is taken. These specimens are rather larger than those found in the Catskills. They are understood to have been taken in the Mountains of Pennsylvania, but in what locality is not now known, as they were supposed to be a variety of *Ursula*.

Proserpina has the same habits, and, in the Catskills, the same season, as *Arthemis*, with which it associates, frequenting the forest paths, rarely seen in the open country, and always attracted by any animal matter. It is much less abundant than *Arthemis*, and is more shy and difficult of capture, flying into the trees at the slightest alarm. It unites the characters of *Ursula* and *Arthemis* in a singular manner. Excepting the white band on primaries, the upper surface is that of *Ursula*, while the lower is very near *Arthemis*, varying in shades of ground color from dark to light brown and reddish-brown as does the latter species.

Mr. Scudder has not noticed *Proserpina* among the White Mountains, but it will probably be found there.

LIMENITIS.

III.



Drawn by Mary Peart

Bowen & Co Lith Phila

WEIDEMEYERII. 12♂34♀.

LIMENITIS II.

LIMENITIS WEIDEMEYERII. 1—4.

Limenitis Weidemeyerii, Edwards, Proc. Acad. Nat. Sci. Phil. 1831.

MALE. Expands 2.6 inches.

Upper side brownish-black with a broad, common, white band a little beyond the middle of wings, bent towards costa on primaries and tapering posteriorly on secondaries, divided into long spots by the black nervures; outside the band, on secondaries, a row of fulvous spots more or less obsolete; on both wings a submarginal series of small white spots, minute or obsolete on secondaries; anterior to these, on costal margin of primaries, a short, transverse row of four white spots, the second from costa largest, the fourth minute.

Under side paler with the band and costal spots as above; the fulvous spots on secondaries large; a common, sub-marginal series of large lunules, (bluish-white except towards apex, where the inner portion is white,) cut transversely and unequally by a crenated black line that is parallel to the margin; on primaries a ferruginous bar upon the arc, followed within the cell successively by blue atoms, a bluish-white bar, ferruginous patch, and the blue atoms near base; costa ferruginous; on secondaries, the entire abdominal margin up to median and the costa next base, bluish-white, the nervures being heavy and black; rest of basal space between costal and median blue-grey, crossed irregularly by black stripes.

Body above black, abdomen beneath white, with a white stripe laterally; legs black, white on under side; palpi white, black above; antennæ and club black.

FEMALE. Expands 3 inches; similar in colors and markings to male.

Larva unknown.

Found in Colorado; common in vicinity of Pike's Peak, according to Mr. Ridings, who collected in that region in 1864.

LEPIDOPTERA.

III.



Drawn by M. A. Deart

Printed by C. L. F. H. F. H.

LORQUINI 1 2 3 4

LIMENITIS III.

LIMENITIS LORQUINI. 1—4.

Limenitis Lorquini, Boisduval, Ann. Ent. Soc. France, 1852.

MALE. Expands 2.4 inches.

Upper side dark velvety brown except the apex and upper part of hind margin of primaries, which is fulvous; both wings crossed by a yellowish-white median band separated into spots by the nervules and bent forward nearly at right angles on costal margin of primaries; midway between the band and apex an abbreviated row of four small white spots depending from the costa; near anal angle two small, rather indistinct, fulvous spots; fringes dark brown, white in the emarginations.

Under side ferruginous except base and inner margin of primaries, which are fuscous, and base of secondaries which is fuscous mottled with ferruginous; the spots as on upper side, but in addition, a submarginal common series of bluish-white lunules and sagittate spots, each, except the apical, edged above with fuscous. Shoulder and abdominal margin of secondaries broadly bordered with bluish-white, and the ferruginous spots of basal space partly covered with same color.

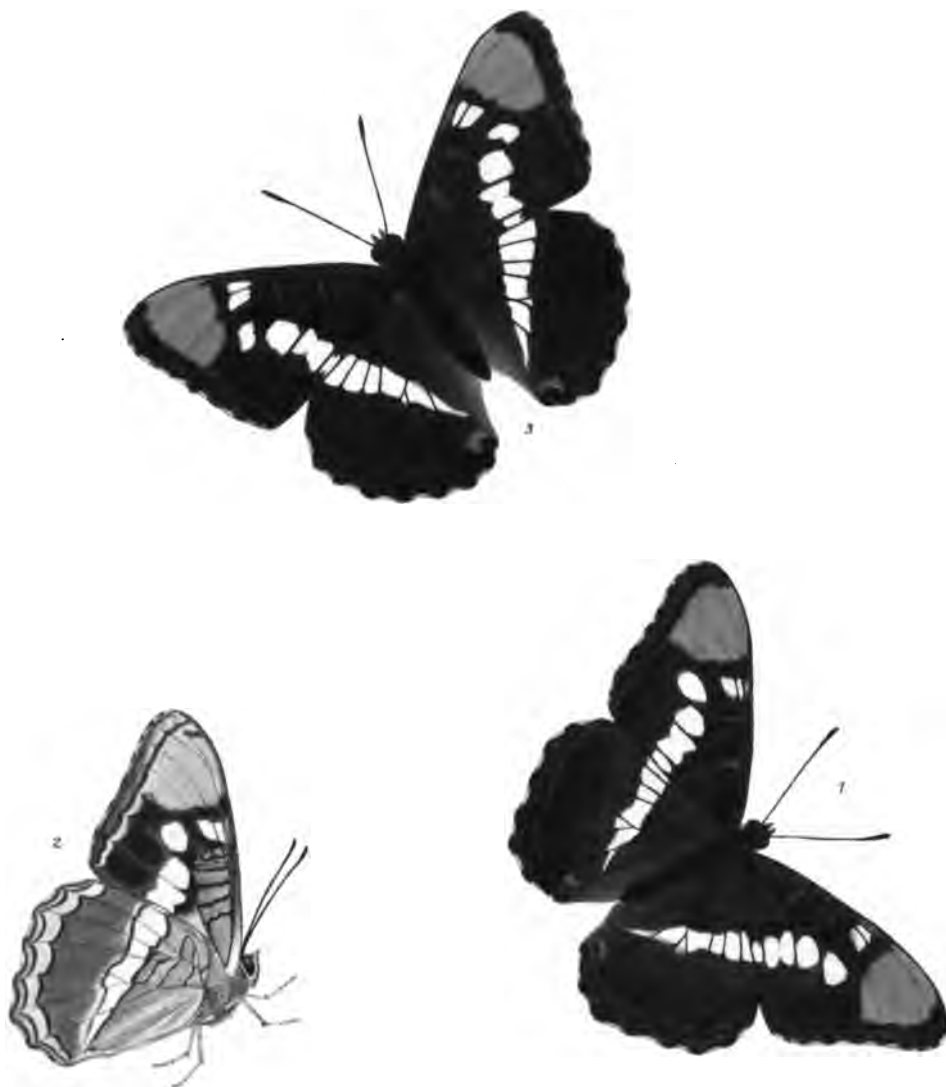
Body dark brown above, with a lateral white line near extremity of abdomen; thorax grey and fulvous; legs fuscous; palpi white, dark brown above; antennæ and club dark brown, tip ferruginous.

FEMALE. Expands 2.7 inches. In color and markings similar to the male.

According to Dr. Behr, "the caterpillar feeds on willows and looks very like that of *Dissippus* as figured by Boisduval and Leconte, the fleshy spines of the neck being considerably shorter and whole coloration of a brighter green." Mr. Henry Edwards says of the imago, "It is always found where Willows grow, flying up and down pathways in the hottest sunshine. It alights frequently and is an easy prey to the collector. I have never found it far from the vicinity of water."

LIMENITIS.

IV.



Drawn by Mary Peart.

Bowen & Co. lith Phila.

BREDOWII. 1 2. ♂ 3. ♀

LIMENITIS IV.

LIMENITIS BREDOWII. 1—3.

Limenitis Bredowii, Hubner, Zutrage v, pl. 10. *Eulalia*, Doubleday, Gen. Diur. Lep., pl. 36. Boia. Ann. Ent. Soc. Fr., 1852. Edwards, Proc. Acad. Nat. Sci. Phila., 1862. *Californica*, Butler

MALE. Expands nearly three inches.

Upper side velvety olive brown, deepest on outer limb; hind margins bordered by a broad crenated band, (paler than disk,) through which runs a dark line; a large golden yellow apical spot fills the space between the marginal band and the narrow costal border of primaries; across the disk a common white band, commencing on costa of primaries with a large spot cut into three by the nervures, followed by a second, oval, separated from the first by a wide space and out of line in the direction of inner angle; after this, the band is uninterrupted except by the brown nervures, and diminishes to a point a little within abdominal margin; on arc of primaries, a narrow ferruginous bar and another in the cell, each edged by black wavy lines; a similar line midway between the bars; at anal angle a black spot within a ferruginous lunule; fringes brown, white in the emarginations.

Under side pale brown, with a bronze lustre on secondaries; primaries have a broad, brown hind margin, crenated next inner angle, with a faint pale blue line running through it and edged anteriorly by a narrow pale blue band; sub-apical spot as above, paler; below this to inner margin dark velvety brown; the white band as above; bars in cell large, pale fulvous; marginal border of secondaries narrow, crenated, enclosing a blue line and bordered anteriorly by a broad blue band; the white band is edged without and at its extremity suffused with pale blue inclining to purple; beyond to base bars of blue alternating with yellow-brown from costal to median nervures; abdominal margin blue, especially next base; the nervures about base much bordered by blue.

Body above olive-brown, beneath white; palpi white below, brown above; antennæ and club dark brown.

This beautiful species connects the genera of *Limenitis* and *Heterochroa*. It is found more or less throughout California, especially in the southern counties, frequenting wooded valleys, and is of similar habits to *Lorquini*.

Respecting its habits Mr. Henry Edwards writes, "This is a far more local insect than *Lorquini*, and is never found in any great numbers. Its usual haunts are in shady canons and by the side of creeks. Its flight is slow and graceful and it occasionally floats along with outspread wings for a considerable distance. It frequently alights near small pools of water and is greatly attracted by any offensive odor. I have more than once seen it in the vicinity of slaughter houses, alighting upon the foul drainage from these places." Of the larva, I am unable to obtain any information.

APATURA.

I.



Drawn by Mary Peart

Bowen & Co. Ltd. Phila.

ALICIA. 1. 2. ♂. 3. 4. ♀.

APATURA I.

APATURA ALICIA, new species. 1—4.

MALE. Expands 2.5 inches.

Upper side: primaries tawny at base, along inner margin, upon hind margin above inner angle, and within the cell; rest of wing fuscous; in the second median interspace a large black ocellus with tawny iris; upon the outer limb two transverse rows of spots, the sub-marginal of four, white, extending from costa to the ocellus, rounded or oval, except the second which is cordate and outside the line; the median row, sinuous, of seven, large, yellowish-white, the fifth nearly twice the size of any other, the fourth smallest and the two last connected, all rounded or oval; a black bar at extremity of cell and two rounded spots near base.

Secondaries tawny, fuscous upon costa and upon margin at outer angle; hind margin bordered by two lines, of which the outer one is heavy and parallel to margin, the inner is delicate, sinuous from the middle to outer angle; across the disk a row of six oval black spots, the first, third, fourth and fifth nearly equal in size, the second much larger than either of the others and the sixth smallest; beyond these an indistinct sinuous brown line and two marks in the cell; on middle of costa a large yellow-white patch; fringes alternate white and fuscous.

Under side of primaries grey white next base and pale yellow-brown on inner margin; the apical half much clouded with fuscous; upon hind margin a dull ferruginous line, anterior to which is a second, fuscous, less distinct, partly sinuous, and serving as the outer edge of the fuscous space; two black ocelli, with five brown irides, one corresponding to that of upper surface, the other near apex, small and enclosing a cordate white spot; the other spots as above but more diffused and purer white towards costa; across the disk a sinuous blackish band bordering the inner edge of the row of spots; the black marks in cell as above.

Secondaries grey-white with a pearly or lilac tinge; hind margin pale brown; across the disk anterior to and partly embracing the ocelli a narrow cloud of pale fuscous; upon hind margin a line like that on primaries, preceded by a second corresponding to that of upper side; beyond the clouded space a brown sinuous line running from costal nervure nearly across the wing, then half-way towards and over to abdominal margin, forming in the last of its course two crenations, the anterior of which encloses an oval black spot edged by light brown; in the cell a bar and two small spots, and a third next above the cell on subcostal; six ocelli corresponding to the black spots of upper surface, but smaller, the last one duplex, each surrounded by a brown iris and dark halo and enclosing a metallic green pupil.

APATURA I.

Body above tawny, beneath soiled white; legs yellowish; palpi same, tipped with fuscous; antennæ brown, annulated with white, club blackish above, ferruginous below, yellowish at tip.

FEMALE. Expands 2.3 inches.

Primaries less produced and much broader than in male; secondaries broad and rounded; the color of under surface more purple, but otherwise like the male.

This species is allied to *Clyton* in shape and general markings, but is much larger with the spots and ocelli relatively larger, and is of quite different coloring. The only specimens I have seen are those figured on the plate. They were sent me from New Orleans, and were taken in the vicinity.

PAPHEIA.



Drawn by Mary Peart.

Engraved by C. L. H. H. H.

GLYCERIU. 1 2 3 3 ♀.
 4 YOUNG LARVA. 5. MATURE LARVA
 6 CHRYSALIS
 Food plant. Croton Capitatum.

PAPHIA.

PAPHIA GLYCERIUM. 1—6.

Paphia Glycerium, Doubleday, Gen. Diur. Lep. pl. 50. Riley. Am. Ent. Feb. 1870.

MALE. Expands 1.7 inch.

Upper side copper red; hind margins edged by a black border with grey or purple reflections; on the arc of primaries a black band, a patch on costa of secondaries and a stripe near outer angle. Under side dead-leaf brown, with a grey lustre, tinted on inner margin of primaries with reddish, and throughout densely covered with dark scales; the basal half of both wings deep-colored, limited without by a wavy edge; beyond this, and reaching to the dark marginal border, a broad, wavy band of paler color, bifurcated on costal margin; a small cluster of luteous scales in sub-costal interspace of secondaries and on middle of disk.

Body above reddish brown, beneath color of wings; legs buff; palpi grey brown; antennæ black above, reddish below.

FEMALE. Expands 1.9 inch.

Upper side pale red; marginal border of primaries very broad, enclosing a yellow-red, wavy band, imperfectly bifurcated; on secondaries a similar band, contracted at outer angle, much expanded on disk and partly enclosed by a black stripe from outer angle; under side vinous brown, with grey reflections.

The larva when young is light bluish green thickly covered with soiled white papillæ. Scattered among these are light orange papillæ of a larger size with occasionally one of brown. These papillæ are hemispherical, hard, opaque and shining, and the larva feels rough and harsh to the touch. At each moult some of the papillæ disappear, especially all the brown ones, the green shade becomes more apparent and the skin softer.

Mature larva; length 1.55 inch; cylindrical, tapering each way from third segment; color light bluish green; surface rough, covered with whitish papillæ; head sub-quadrate, bilobed, bluish green, a pair of orange papillæ on vertex; neck green, constricted, retracted within second segment when at rest; spiracles brownish yellow. *Chrysalis* at first light green, soon changing to whitish green or to light cinerous brown; the whole surface indistinctly marked with fine parallel streaks of darker color; in form short, thick, gibbous, the abdominal segments contracted almost into a hemisphere.

PAPHIA.

The genus *Paphia* contains a number of species which inhabit the tropical regions of America, from Mexico to Brazil, but *Glycerium* is the only one whose range is known to extend into the United States. It is found upon the prairies of Illinois, Missouri, Kansas and Texas.

I have never seen it on the wing, but am indebted principally to Dr. L. K. Hayhurst, of Sedalia, Mo., for copious notes upon its habits and for descriptions, as also for the drawing of the food-plant, larva and chrysalis represented on the plate.

Dr. Hayhurst says: "The larvæ feed on the plant commonly known as Wild Sage, *Croton capitatum*, as many as a dozen individuals being sometimes found on one low bush.

"The leaf of this plant is ovate-lanceolate, about two inches long and three fourths inch broad. On the mid-rib the larva extends itself, its head toward base of leaf and attaches a thread to the edge at about one third the distance from base to apex. By a tension on the thread it draws this edge partly towards the other and there fastens it, being assisted by the natural tendency of the leaf to curl inward. The operation is repeated until the edges meet, when the larva proceeds to join them firmly, almost to the apex, leaving a small opening through which to eject its castings.

"During the heat of the day, it remains concealed, but towards evening comes out to feed, though sometimes it feeds upon its own house, eating the leaf half way down from base to point, then abandoning it and rolling up a new one.

"When placed in a cool, shaded room, the larvæ seldom rolled up leaves, but fed at random over the plant, and when at rest simply lay extended on the leaves. Many, though not all, of the rolled leaves that I cut open, were completely lined with a closely woven coating of strong white silk.

"In a glass breeding cage, the larva will travel over the sides as readily as over a rough surface. This it does by spinning a sort of rope-ladder in advance, describing segments of circles by the motion of its head from one side to the other.

"When ready to transform it spins a button of white silk on the under side of a leaf or branch, and, fastening the anal legs therein, doubles upon itself until the extremities meet. In this position it remains about twenty four hours when it suddenly throws off its larval skin and becomes a chrysalis. Some of my chrysalids were eighteen and twenty days before the butterfly emerged.

"The flight of the butterfly is exceedingly rapid, with a dry, whistling sound. Although easily alarmed it seldom leaves a favorite locality, but continues to fly about until danger has passed. It is curious as the *Vanessas*, and I have several times taken it by standing motionless, when after numberless rapid circlings and dashes about me, it would suddenly alight on the ring of my net.

PAPHIA.

"Undoubtedly this species hibernates. Early in November the butterflies that I had bred from larvæ were still active but had gone into winter quarters among the dried leaves and stems of the food plant in the breeding cage, selecting the closest, narrowest corners and squeezing themselves in. After the weather had become quite cold I put the cage into a dark cellar and left it there about a week when I brought it back to the warm room. The butterflies were dormant but soon revived and flew about as briskly as ever. I then returned them to the cellar where they remained till the Spring when I brought them out and placed them in the sun. After a few hours two revived and flew about the room. The other was dead.

"During last winter, (1870) in February, a tree was felled on the line of the railroad on which I was at work. As it fell it split open and was found to be hollow. The cavity was partly filled with dirt and hickory-nut shells, but among the stuff that fell out were some twenty butterflies, mostly *Vanessas*—*Antiopa* and *Atalanta*. But among these were seven specimens of *Glycerium*.

"This species has but one brood. I have noticed that the food plant does not sprout up and leaf sufficiently to support the larvæ before 1st of July.

"I have found the butterfly very common wherever the food plant occurs throughout South Western Missouri, Southern Kansas, the Indian Nations and in Texas, particularly on the dry hills bordering on the Brazos River."

I have also received notes respecting this species from Mr. J. H. Muhleman, of Woodburn, Ills., who seems to have first observed its transformations. Mr. Muhleman says, "I am satisfied that there is but one brood. Last year I examined the food plant during several months, but found no larvæ till September. The butterfly is shy and difficult to capture. I have observed it in orchards resting on the sunny side of the trees, at other times on the road or upon the fences, and it has much the appearance of a *Vanessa*, only while this last rests with wings half spread, the other rests with wings closed. I have found the larvæ from 3rd September to 30th. The chrysalis state lasts from 10 to 14 days. My last butterfly appeared 10th of October. At this date, 25th of Jan., I have two living specimens, proving the fact of the hibernation of the species."

THE CLA.

I.



Drawn by Mary Peart

Bowen & Co. Lith. Phila.

LAETA, 12 & 3 4 ♀ ACADICA, 5 6 & 7 ♀

THECLA I.

THECLA LAETA. 1—4.

Thecla laeta, Edwards, ♂, Proc. Acad. Nat. Sci. Phil. 1862. ♀, *Thecla Clothilde*, Edw. Proc. Ent. Soc. Phil. 1863.

MALE. Expands .9 inch.

Upper side black; near base of primaries a few scales of deep metallic blue; next anal angle of secondaries a band of same color, which extends half way along the hind margin, many of the scales being replaced by black; beyond this band a fine line of blue scales follows the margin to outer angle; anal angle edged with red; fringe grey.

Under side of secondaries and apex and costal margin of primaries slate blue with a green reflection; costal edge of primaries red; disk of same wings smoke color; beyond the cell, on costal margin, a transverse, abbreviated series of five small red spots, edged posteriorly with white, the last two obscured by the smoky hue of the disk.

Secondaries have two series of red spots parallel to the hind margin; those of the exterior small and towards the outer angle minute, each more or less surrounded by a delicate white border, in which are a few black scales; the inner series crosses the middle of the wing, is sinuous, the spots large, brighter red and crescent shaped, bordered posteriorly with white in which are a few black scales; edge of the wing at anal angle and at the intersection of the adjoining nervures red; thorax and abdomen above black, beneath white; legs and antennæ annulated white and black; palpi white; club black, red at tip.

FEMALE. Expands 1.1 inch.

Upper side black; the base of primaries, and inner margin for two-thirds its length, and all of secondaries, except the costa, dark metallic blue. Under side greenish-grey, losing the green tinge on inner margin of primaries; in addition to the five spots on disk of male are two blackish, rather indistinct spots, below the others, nearer the base.

Canada; Maine; West Virginia.

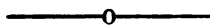
The male of *laeta* originally described was one of two taken near London, Canada, by Mr. Saunders in 1861. In April of the present year (1868) at Coalburgh, Kanawha Co. W. Va., I was called by a laborer to look at a "fly" in a post hole that he was digging beneath a hop vine, which "fly" he supposed he had brought to light in his operations. I took the insect between thumb and finger,

THECLA I.

and very much to my surprise it proved to be a perfect specimen of *leta* female, that doubtless had been at rest on the vine, and chilled by the cool morning air had been suddenly jarred from its place into the hole. The difference in color between the male and female is much of the same nature as between the sexes of *Thecla Poeas*, the female being much more highly ornamented with blue than the male. The sexes in *Thecla* have similar markings on under surface and are easily identified by that means. On comparison, this female proved to be identical with *Thecla Clothilde*, which I described in 1863 from a worn and faded specimen received from Rev. Mr. Provancher, near Quebec, having then no suspicion of its affinity to *leta*.

Mr. Scudder, in his Supplement to a List of the Butterflies of New England (*Proc. Bost. Soc. Nat. Hist.* 1868), mentions *Clothilde* as having been taken near Paris, Maine, on 22nd July.

The Theclas are widely dispersed, but are rarely met with and are difficult of capture from their extreme restlessness and activity, darting about with so rapid, jerking a motion that it is almost impossible for the eye to follow them. The present species is tropical in its coloring and seems quite out of latitude in the Northern States.



THECLA ACADICA. 5—7.

Thecla Acadica, Edwards, *Proc. Acad. Nat. Sci. Phila.* 1862.

MALE. Expands 1.2 inch.

Upper side dark brown; costal edge of primaries red; on the disk a smooth oval spot; secondaries have a single tail (unless the very slight projection at extremity of the second median nervule be so designated) which is black, edged towards anal angle and tipped with white; from its base a bluish white line extends along the margin to the anal angle; the space next above this line sprinkled slightly with fulvous scales making a broad band more or less distinct, which terminates beyond the tail in a clear fulvous spot; fringe of both wings fuscous, at the anal angle black, next before the tail white, beyond it black through which runs a white line.

Under side grey with a pearly lustre (but sometimes brownish-grey or even sordid grey-white); on primaries a short discal bar edged with white; beyond this, a bent, transverse row of black spots each surrounded by white, the one next costa minute, the next three round, fourth and fifth oval and sixth double; within and along the margin a row of elongated pale fulvous spots, gradually becoming obsolete towards apex, narrowly edged on the inner side by black on which rests a line of bluish-white.

THECLA 1.

Secondaries have a long discal streak, a curved transverse row of black spots and streaks, each surrounded or edged by white, the six from costa nearly round, the fifth being anterior to the general line, the seventh long and bent towards anal angle, the last a streak running up the margin and bent near its inner extremity; hind margin edged with whitish and bordered by a vermillion (sometimes orange) band which is divided by the nervures into spots, each of which is arched above and edged with black on which rests a line of bluish white; this band extends some distance up the abdominal margin and encloses, on hind margin near anal angle, a large rounded space sprinkled with blue atoms; the three or four red spots next outer angle partly obsolete and the spot next the blue patch sometimes edged on the marginal side by black; in some specimens a black edge at anal angle.

Body above dark brown, below greyish-white; legs greyish-white; palpi white, at extremity black tipped with white; antennæ black annulated with white; club black, reddish at tip.

FEMALE. Same size. Similar to the male, only wanting the oval spot on primaries.

Taken in Canada, near London, and in various parts of New England and New York.

I have received from Mr. Saunders a description of the larva and chrysalis of this species as follows:

“Found feeding on willow, June 11, 1865, June 18, 1866, and about middle of June 1867 and 1868. Length 0.63 inch; onisciform. Head very small, pale brown and shining, drawn within the second segment when at rest. Body above green, of a moderately dark shade, thickly covered with very short whitish hairs, scarcely visible without a magnifier. Body thickest from third to tenth segments; a dorsal line of a darker shade of green than the rest of body. Dorsal region flat, rather wide and bordered with a raised whitish-yellow line, beginning at the third segment and growing fainter on twelfth and thirteenth. Sides of body inclined at an almost acute angle and striped with faint oblique lines of greenish-yellow. A whitish-yellow line borders the under surface beginning at the anterior edge of second segment, and extending entirely around the body to a point opposite the place of beginning; this line is raised in the same manner as that bordering the dorsal ridge. Twelfth and thirteenth segments much flattened. Under surface similar to upper, with the same coating of short fine hairs; feet and prolegs partake of the general color. In a younger specimen the head was almost black with a streak of white across the mandibles. The under side was rather deeper in color than upper, with a faint bluish tint.

“Chrysalis 0.32 inch long; greatest width 0.15 inch; thickly covered with minute hairs. Color pale brown with many dots and patches of a darker shade;

THECLA I.

a dark ventral stripe from seventh to terminal segments; sides of body with four or five short lines of dark brown. The duration of the chrysalis state is about eight or nine days. I have had specimens enter the chrysalis as late as July 3rd."

Since the description of *Acadica*, in 1862, some of our lepidopterists have doubted if this species was not identical with *falacer*, Godart, and of Bois. and Lec. Messrs. Grote and Robinson have contributed some valuable papers on this and allied *Theclas* to the Trans. Am. Ent. Soc. 1867, and show clearly that *falacer* of Godart and of the text of Bois. and Lec. (but not of the plate,) and of Harris, Ins. Mass. is properly *T. Calanus*, Westwood; that *falacer* of Bois. and Lec. plate, is a distinct species, now called *inorata*, G. & R.; and that *Acadica* differs from either. The latter is readily distinguished from the others by the color of its under surface, the extra-discal band of spots, and the extended vermillion border.

The flowers in the accompanying Plate are said to be varieties of *Phlox divaricata*, and are common in the woods throughout the Kanawha district in the months of April and May.

THE CLA.

II



Drawn by M. J. F. J. J.

Printed by J. J. J. J.

ONTARIO 12 5 STRIGOSA 3 4 8 5 6 2

THECLA II.

THECLA ONTARIO. 1—2.

Thecla Ontario, Edwards, Trans. Am. Ent. Soc. ii, p. 209, 1869.

MALE. Expands 1.1 inch.

Upper side dark brown, color of *T. Acadica*; on costal margin of primaries a large smooth oval spot; secondaries have a single tail and a very slight projection at extremity of second median nervule; from the base of the tail a faint white line extends along the margin to anal angle; at this angle a few scales of fulvous; between the first and second median nervules an indistinct marginal dark spot above which are a few fulvous scales in crescent form; tail black, tipped with white; fringe of both wings fuscous, next before the tail white, beyond it, black at extremity, white next the margin.

Under side uniform light brown, color of *T. Calanus*, Westw. (*falacer* of Godart and Harris); across the disk of primaries a nearly straight, narrow band of dark spots, slightly edged without by white; this band is continuous except that the two spots in the second and third median interspaces are somewhat lunulate and separated; parallel to the margin is a second band of faint spots, of dark brown, nearly obsolete at each extremity; on the inner edge of the three or four middle and most distinct of these spots are a few white scales.

Secondaries have a discal row of spots like those of primaries, but separated, forming a nearly straight line (the two middle spots only being outside the line) from the costa to a point just above the black space that surmounts the blue patch, then turning towards abdominal margin in a zigzag course forming the letter W, the last limb of which is long and reaches the extreme margin; hind margin edged by a fine whitish line and bordered by a row of spots occupying the interspaces, each of which is edged above with a curved black line on which is a second bluish-white line; the four spots next apex almost obsolete, merely showing a darker tinge than the ground color, and on these the black crescents are not distinct and the white line is represented by a few scales only; the fifth spot a shade darker than the preceding and edged above with a narrow patch of orange-red; the sixth black with a broad red arch between it and the black line; beyond the tail a large patch of blue scales on a black ground which it does not wholly cover, leaving above the blue a small black spot on which are a few red scales; at the angle a rounded black spot narrowly edged above with white, between which and the black and white lines, which here are not crescent, is a red space.

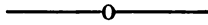
Body above fuscous; beneath, abdomen ashy-brown, thorax blue-grey; legs

THECLA II.

white and black; palpi white tipped with black; antennæ annulated white and black; club black tipped with ferruginous.

From a single specimen taken by Mr. E. B. Reed, at Port Stanley, Ontario, in July, 1868.

This species is allied to *T. humuli*, Harris, (*hyperici*, Bois. and Lec.), but differs in several respects; especially in the color of under surface, in the absence of a fulvous border to the discal lines in each wing, in the conspicuous blue patch and red and black submarginal crescents; *humuli* also is double-tailed, the shorter of the two, being twice as long as the tail of the present species.



THECLA STRIGOSA. 3—6.

Thecla strigosa, Harris, Ins. Mass.

MALE. Expands 1.1 inch.

Upper side fuscous, without spots; secondaries have two tails, the inner one twice the length of the other, each bordered and tipped with white; fringes fuscous, on secondaries crossed by a whitish line.

Under side pale brown; the outer limbs of both wings crossed by four irregular, rather wavy white lines, varying a little in individuals, but of which the two inner ones on primaries approximate posteriorly; the third being shorter than the second and the fourth or outer one reaching only to middle of wing; on secondaries the inner line extends nearly across, then bending at a small angle runs some way up abdominal margin, preceded in the last part of its course by another line nearly parallel to it; above the termination of these two a circlet of white on the margin; the outer line is short and limited to the middle of the wing; primaries have a submarginal row of indistinct brown lunules edged anteriorly by white; secondaries have a similar series, but posteriorly large, bright red, edged above with black which itself is edged with white, enclosing next anal angle a large black space nearly covered with blue scales; beyond this a small black spot; another at the angle surmounted by a red stripe edged like the lunules and extending up the margin; the lunules next outer angle usually exhibit a few scales of red; margins of both wings edged by a fine whitish line.

Body fuscous, beneath greyish-white; legs white annulated with brown; palpi white, the upper joint black tipped with white; antennæ annulated black and white; club fuscous tipped with white.

FEMALE. Expands 1.2 inch.

Paler than male; in some cases showing a fulvous spot near anal angle of secondaries; the wavy line edged anteriorly by dark brown.

THECLA II.

Strigosa has also been taken in Massachusetts ; at Thornton, New Hampshire ; and at Coalburgh, W. Va., but seems to be rarer than most species of the genus.

The plant represented in the plate is *Silene Virginica*, and is not uncommon among the mountains of West Virginia, flowering in May.

The larva of this species is thus described by Mr. Wm. Saunders.

"Taken when bush-beating, June 13th, 1866 (London, Ontario,) upon a species of *Cratægus*.

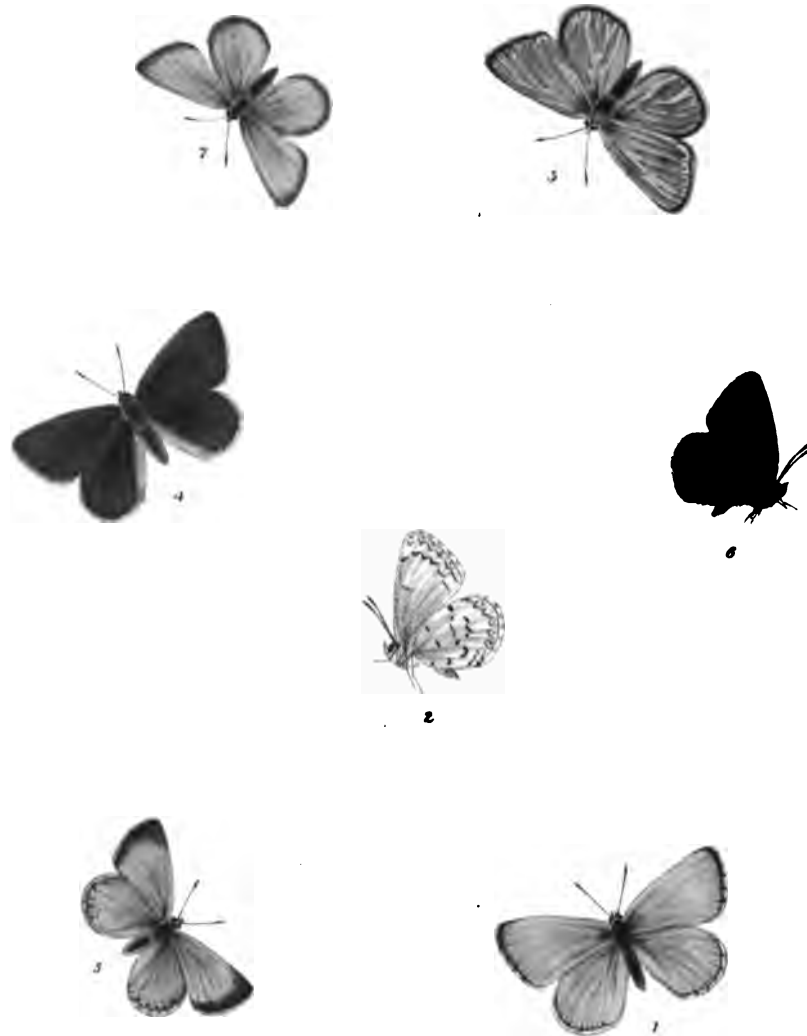
Length one-half inch. Head greenish-brown. Body flattened, sloping abruptly at sides ; color velvet-green, with a deeper colored dorsal stripe ; anterior edge of second segment yellowish-brown with a few darker dots ; middle segment laterally striped with two or three faint yellow oblique lines ; the last two segments have each a lateral yellow patch ; from the fifth to terminal a faint yellow basal line ; under surface bluish-green.

Changed to chrysalis June 19th.

Length of pupa .37. Form nearly oval ; head-case rounded ; body dark reddish-brown with black markings, and thickly covered with fine hairs ; anterior segments with many black patches ; a dark ventral line from 6th to 12th segment."

LYCAENA

I.



Drawn by Mary Peart

Bowen & Co Lith Phila

VIOLEACEA, 1. 2 ♂ 3 ♀ 4. ♀ VAR. LYGDAMUS, 5. 6 ♂ 7 ♀.

LYCÆNA I.

LYCÆNA VIOLACEA. 1—4.

Lycæna violacea, Edwards, Proc. Ent. Soc. Phila. 1866.

MALE. Expands .9 to 1.2 inch.

Upper side usually deep glossy violet blue, but sometimes with a pink tinge; costal margin of primaries silvery; hind margins of both wings edged by a black line which is expanded on the apical half of primaries into a border; on this part of the wing the fringe is black, but on the lower half and on secondaries it is white with black at the ends of the nervules; occasionally on secondaries it is entirely white; in many cases the black marginal line turns the anal angle and there thickens so as to make a conspicuous spot; as often there is an elongated spot at the outer angle and sometimes five or six dots between these two spots along the margin.

Under side of both wings greyish-white, of uniform color entirely to the margin; primaries have a dark grey discal streak, a sub-marginal transverse row of six rather broad, mostly elongated black spots, the first next costa in advance of the line, the others parallel to the margin, the 3rd, 4th, and 5th standing obliquely; along the margin a row of six points, often partly obsolete, each preceded by a distinct dark-grey crescent, these last uniting so as to make a crenated line.

Secondaries have a discal streak; three black spots in a row between the streak and base, one being on either margin, the third midway between them; a transverse row of eight clear black spots across the disk, the two next costa largest, much in advance of the others and over against the streak, with which and the eighth spot they form a direct line; the third is separated from the second by a considerable space, the fourth is turned obliquely; the seventh is long, lunular and back of the line; eighth, near the margin, elongated; along the margin is a row of six blackish dots, palest at outer angle, that next anal angle double, the one preceding largest; each spot surmounted by a crescent as on primaries.

Body above blue, beneath white; palpi white; antennæ black ringed with white; club black tipped with ferruginous.

FEMALE a. Same size; paler and dull colored; the hind margin and apex of primaries with a broad blackish border; costa of both wings obscured by same color.

b. Upper side uniform blackish-brown; under side like the male.

On the Kanawha River this is the earliest butterfly of the year. After the stormy weather of March is past, usually about the 20th, on the first sunny day,

LYCÆNA I.

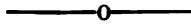
will surely be seen two or three of these little "harbingers of Spring" gently flitting about any moist, sheltered spot on the road, out of reach of the wind which still has a wintry chill, conspicuous from their charming color, which, in the sunlight is intense, as near as may be like *Salvia patens* among flowers. They evidently enjoy their escape from long imprisonment and make the most of their stay, which will be but brief, scarcely beyond the next night's frost.

By the 3rd or 4th of April, we usually have one or two very warm days, the mercury at 80°, and then these little butterflies swarm along the sandy sides of the creeks, gathering in clusters as close as they can stand, in favorite spots, motionless, with wings erect and closed, wholly intent on extracting from the sand some fluid no doubt delightful. With them will often be seen some of the smaller Hesperians, especially that sturdy little fellow, *H. Samoset*, Scud. (*nemoris*, Edw.) who has placed himself like a sentinel outside the throng, with wings half open and suspicious antennæ, ready to dart away for the least cause, frightening for a moment his busy associates. He will not return till the danger is past, but they, after fluttering about a little, settle down as before. These are all males, for the females do not appear till some days after, or about the 10th. By this time the peach trees are in full bloom, and the females are especially attracted to them. But as a general thing this species is not partial to flowers.

Most of the females are of the black type, variety *b*. Out of nearly one hundred taken in 1867 but five were blue.

By the end of April, *violacea* is no more seen, there being but a single brood.

I have received specimens taken near Philadelphia and at London, Canada. This species is probably to be found dispersed over New England and New York, and I think has been confounded with *Lucia* of Kirby, a paler species with mottled under surface, and of which an excellent figure is given in the *Fauna Boreali-Americana*.



LYCÆNA LYGDAMAS. 5—7.

Lycæna Lygdamas, (Lyg'-da-mas,) Doubleday. *Polyommatus Lygdamas*. The Entomologist, No. 14, Dec. 1841.

MALE. Expands 1.3 inch.

Upper side wholly silver-blue; costa of both wings and the nervules for a little distance from the margins fuscous; fringes long, fuscous.

Under side uniform grey-brown; primaries have a small round black spot within the cell, a bent bar at its extremity, both edged entirely with white; within the margin a transverse curved row of seven large rounded black spots, the two lower ones connected, all surrounded by white.

LYCÆNA 1.

Secondaries have a small black spot within the cell, another on costal margin, a narrow stripe in the disk, and a sinuous row of spots within the margin similar to those of primaries, all edged with white.

Body above fuscous covered with blue hairs; abdomen beneath white; palpi white at base, fuscous at extremity; antennæ black annulated with white; club black, white near tip, which itself is black.

FEMALE. Same size.

Upper side sometimes entirely blue except along the margins which are fuscous; the blue deeper colored and less dense than in the male; sometimes the greater part of the surface is fuscous, the blue shade being confined to the base of the wings; under side paler, but marked as in the male.

Found in Michigan, Ohio, West Virginia and through the Southern States to Georgia. Doubleday gives its habitat in the pine forests, but in West Virginia, I have usually found it in the garden or about houses. It appears there early in April, a few days after *violacea*, but is rare, not more than half a dozen being seen in a season.

LYCAENA

II.



Drawn by J. G. S.

Engraved by J. G. S.

PSEUDARGIOLUS 1 2. ♂ 3 ♀.
NEGLECTA. 4 5 ♂ 6 ♀

LYCÆNA II.

LYCÆNA PSEUDARGIOLUS. 1—3.

Lycæna Pseudargiolus, Boisduval, Bois. & Lec. Lep. des Amer. p. 118, text, not plate. Edwards, Proc. Am. Ent. Soc. 1866. *Argiolus*, Abbot & Smith, Ins. Geo. pl. 15. *Neglecta*, Harris, Ins. Mass. 2nd. edition, page 274, text, not plate.

MALE. Expands 1.4 inch.

Upper side delicate pale blue with a pink tinge; costa of primaries silvery; hind margins edged by a black line which sometimes is expanded upon the apical part of primaries into a border; fringes black and white on primaries, white on secondaries.

Under side white, sometimes pure, but oftener with a greyish tinge; the spots and markings pale black or brown, often nearly or quite wanting; when distinct, primaries have a discal streak, a transverse row of six spots, mostly elongated, the third, fourth and fifth turned obliquely, the sixth frequently wanting; a marginal row of dots each preceded by a serrated tooth.

Secondaries have three dots in a transverse row near the base; a discal streak; a row of eight minute spots across the disk, the two next costa much in advance of the others, the next four and the eighth nearly parallel to the margin, the seventh back of the line; the margin bordered by a row of black points, each preceded by a serrated tooth as on primaries.

Body above blue, below white; palpi black above, white below, tipped with white; antennæ black, ringed with white; club black tipped with ferruginous.

FEMALE. Same size.

The apical half of costal margin and the whole of hind margin of primaries and costal of secondaries broadly, and basal half of primaries narrowly, edged with black; the rest of primaries violet-blue, (sometimes lilac or green) except a large whitish patch on the disk; secondaries a duller blue, not metallic; the hind margin edged by a row of small, rounded, blackish spots. Under side purer white than the average of males. Fringes as in the male.

Larva unknown except as given in the plates of Abbot and Smith and in Boisduval and Leconte. The description accompanying the latter is as follows; "Head black; body green, pubescent; back yellowish; a dorsal red stripe, interrupted, cut transversely near the middle by a red arc which is concave posteriorly; sides with oblique stripes of darker shade than the ground color; above the legs a stripe of obscure green."

LYCÆNA 11.

The figure in Abbot represents the head as red; body green; a dorsal black stripe uninterrupted; sides with oblique black stripes; and therefore differs materially from Boisduval's description, as it does also from his figure.

The present species is found in Virginia, Ohio, and in the mountainous districts as far south as Georgia; also in Pennsylvania and occasionally in New York.

I have often seen it in the months of May and June, upon the Alleghanies of Virginia, sauntering listlessly along scarcely faster than the lumbering, old-fashioned stage coach which still forms the medium of travel in those picturesque regions.

Its large wings and disproportionately slender body give this species a slower and more tortuous and tremulous flight than any other of our eastern *Lycænidae*.

On the Kanawha River it is rather a common species during its season, the males somewhat frequenting the roads, especially where they skirt the edges of the woods, but very much preferring the brooksides in the forest. The females are rarely to be seen in the same localities, but are found in the more open woods among shrubs and low plants. The second brood appears in July and is much less numerous than the first. At this season, the channels of the small streams are nearly dry, and lying as they always do in this region, between lofty and abrupt hills, serve as a highway for many butterflies, *Melitæas*, *Graptas* and others. Many may be here taken that are not often seen elsewhere, as the rare *P. Tarquinius* and *Eudamus Cellus*. This last named is exceedingly rare and very local in its habits. Mr. Ridings, while spending some weeks with me, in 1867, discovered a weather beaten log lying across one of these streams in the depths of the forest, on which for an hour or two the mid-day sun shone and on and about which he captured many specimens of *Cellus*, returning for several successive days for the purpose.

I was formerly under the impression that the males of all butterflies were very much more numerous than the females. They usually appear earlier and may be on the wing from a week to a fortnight, according to the species, before a female is seen. But I now incline to think the sexes nearly equal in number. This is the result of my experience in rearing from the larvæ. The females would naturally be in the neighborhood of the plants upon which their larvæ feed, and upon which, the eggs are to be deposited. These are likely to be away from the flowers or the spots frequented by the males and remote; consequently as a rule far more males are taken by collectors than females.

Abbot & Smith figured the present species under the name *Argiolus*, considering it identical with the European species of that name, which it strikingly resembles in size and color of its upper surface, though differing beneath in several respects.

Boisduval and Leconte describe *Pseudargiolus* with no reference to Abbot and Smith's figures or name, but refer to the true *Argiolus* as very near their species,

LYCÆNA II.

as their name also indicates. In the description they make repeated comparisons with *Argiolus*, and close by saying; "the tint of the under side, the size of the black dots and the marginal lunules easily distinguish this species from *Argiolus*," all which is correct as between the males of the two species in question. They also describe the fringes of the male as white cut with black implying the fringe of both wings. Of the female they say; "The upper side is of a paler and less violet blue, with a large black border upon the forewings and a marginal series of points of same color nearly as in the female of *Argiolus*. At the extremity of the discal cell of forewings is likewise a small black arc. The fringe of forewings is cut with black." This description of the female is that of the species figured by Abbot and Smith. The figure of female on the plate also represents that species, and follows the text. But the description of the male, except in its comparisons with *Argiolus*, and the figure corresponding on the plate, seems not to indicate the *Argiolus* of Abbot and Smith, any more than *Neglecta* or *Violacea*. The figures rather represent the former of these two, especially in the long white fringe to hind wings, while the text describes the fringe of *Violacea*, that is, white cut with black on both wings. It is very difficult to determine closely allied species from any but the most carefully executed plates and in the case of *Pseudargiolus*, I think it probable the description was intended to cover what were considered varieties of one species. In this rather confused state of things it seems to me proper to fix the name *Pseudargiolus* upon that species which is nearest the true *Argiolus*, and which is also the one figured by Abbot and Smith.

The figures of *Pseudargiolus* in Harris represent *Lucia*, Kirby; at least, the under side is of that species, while the text describes *Neglecta*, Edw. which replaces *Pseudargiolus* in the Northern States.

The plant figured in our plate is the Sand Blackberry, *R. cuneifolius*, common in Virginia.

LYCAENA NEGLECTA. 4—6.

Lycæna neglecta, Edwards, Proc. Acad. Nat. Sci. Phil. 1862. *Pseudargiolus*, Harris, Insects Massachusetts, 2nd edition, page 274, (text).

MALE. Expands 1.1 inch.

Upper side of primaries delicate azure-blue, paler in the disk and silvery on costal margin; secondaries greyish-blue, with a broad azure margin; both wings edged by a black line which expands towards apex of primaries into a narrow border and runs a little way along costal margin; fringe of primaries white cut with black at tips of the nervures; of secondaries also sometimes cut with black, but usually wholly white.

LYCÆNA II.

Under side pure white with a bluish tint; primaries have a fuscous discal streak and a transverse row of six fuscous, abbreviated streaks set obliquely; secondaries have a discal streak, three points near base and eight points or streaks crossing the disk in a tortuous line; both wings bordered by confluent fuscous spots, which form a crenated band, each spot enclosing a darker point.

FEMALE. Same size.

Upper sides of both wings of a deeper and more metallic blue; primaries have a broad fuscous hind margin, and this color extends more narrowly along costal margin to base, where it is sprinkled with blue scales; a faint discal streak; hind margin of secondaries bordered by a row of small fuscous spots. Under side as in the male.

Larva, according to Mr. Saunders "found feeding on Dogwood, 12th July. Fed it afterwards on Willow, which it readily ate. Length .45, somewhat onisciform, distinctly annulated. Head small, dark shining brown with a black streak down the middle, mandibles brown with a transverse streak of paler color above. Body dull greenish white with a faint tinge of yellow; the second segment of a deeper shade of green, with a blackish line across its posterior edge; a brown dorsal line; a dull green band across anterior portion of fifth segment and another in same position on eleventh; on each side of each segment, from fifth to eleventh, a spot of same hue extending obliquely backward. Entire upper surface covered with minute dots from which arise short, fine hairs."

Found in the Northern States from New England to Wisconsin; in Canada and in British America as far north as Lake Winnipeg; occasional in W. Virginia.

This species replaces *Pseudargiolus* in the North and has usually been regarded as the species so named. It differs however in size, in shade of color and in the delicacy of markings on under surface.

The existence of two distinct species confounded under the name *Pseudargiolus* was suspected by Mr. Edward Doubleday as long ago as 1841, as appears from remarks by him in the "Entomologist" of that year, page 209.

Neglecta is by no means a common species. So far as my own experience goes in the Northern States I have seldom seen more than two or three individuals upon a June day. At certain spots in the Catskills, especially near the "Fawns Leap" in the Clove south of the Mountain House, a few may always be seen at that season flying about the wet spots by the road side. But in June 1866, in the vicinity of Coalburgh, W. Va., *Neglecta* appeared in large numbers, while I scarcely saw a dozen *Pseudargiolus*, usually so abundant. In the following years to the present (1869), *Neglecta* has again been rare in this district.

SUPPLEMENTARY NOTES.

PAPILIO AJAX.—The chrysalids mentioned in the text as having passed over the winter of 1871—2, commenced yielding imagos in February and continued till 12th April, with the following results:

From 1st and 2nd brood *Walshii*—2♂, 2♀, *Telamonides*, 1♂, *Marcellus*.

From *Walshii* of 23rd May—7♂, 2♀, *Telamonides*, 1♀, *Marcellus*.

From *Telamonides* of 27th May—7♂, 3♀, *Telamonides*.

From *Telamonides* of 28th May—3♂, 3♀, *Telamonides*.

From *Marcellus* of 1st and 4th June—13♂, 23♀, *Telamonides*, 3♀, *Marcellus*.

From *Marcellus* of 29th July—14♂, 13♀, *Telamonides*.

Total 46♂, 46♀, *Telamonides*, 1♂, 4♀, *Marcellus*, and no *Walshii*.

Nevertheless, between the 11th of April and 1st of May, *Walshii* was exceedingly abundant on the wing, and up to 29th of April, Mr. Mead, who was with me, had taken 63 specimens, while he had taken or seen but one *Telamonides*. Soon after 1st of May, the latter variety appeared in small numbers, too early evidently to have sprung from *Walshii* of this year. By 25th of May, *Telamonides* suddenly appeared in such force as to make it certain that they had now begun to come from the larvæ produced from eggs of *Walshii*. But why not one of nearly one hundred chrysalids, from so many broods of 1871, and of all the varieties, should yield *Walshii*, while out of doors this variety was so abundant and for weeks the only one flying, is surprising. The same thing had happened with chrysalids carried over the winter of 1868—9, when of 32 imagos but one was *Walshii*. As the chrysalids were kept in the house and the imagos emerged prematurely, some of them by several weeks, owing to the warm temperature, it is possible that the artificial acceleration may have had to do with producing the later varieties at the expense of the earlier, or *Walshii*.

NEOPHASIA MENAPIA.—The figure given on the plate as the female is erroneous. Until quite lately the two sexes were supposed to be similar, but specimens taken on San Juan Island by Dr. Bremner, show a wide difference.

FEMALE.—Size of male. Color yellowish or soiled white; the black apical patch enlarged, the five enclosed spots being yellowish; costal stripe as in male; secondaries have a broad black border enclosing on the margin a series of separated, rounded yellowish spots that occupy the interspaces from outer angle to lower

SUPPLEMENTARY NOTES.

branch of median nervure, each spot posteriorly and at the edge of the margin being orange; abdominal margin orange tinted.

Under side yellow; primaries marked as above, but secondaries have all the nervures broadly bordered with black scales, which, beyond the disk, nearly fill the interspaces; the black marginal band as above, the spots smaller; an orange patch on edge of margin in each interspace; costal and abdominal margin orange.

COLIAS EURYTHEME.—From Mr. Hayhurst I have received an admirably executed drawing of the egg, larva and chrysalis of this species. The egg is long, fusiform, ribbed longitudinally. Length of mature larva 1.4 inch; cylindrical, tapering posteriorly from 11th segment; head green, translucent; body dark green, somewhat pilose, each segment transversely creased; a narrow white lateral band from second to last segment, through the middle of which runs a broken line of vermilion red. This larva is a little longer and larger than that of *C. Philodice*, which it much resembles, but is without the series of semi-circular black spots next under the lateral band, usually seen on the latter. The eggs were deposited on Buffalo Grass, (*Trifolium reflexum*) and the larvæ fed thereon. Chrysalis .95 inch in length; cylindrical, tapering to a point posteriorly; the head case also produced to a point; mesonotal process rounded and not very prominent; a whitish lateral line runs from wing cases to extremity of abdomen, above which is a black stripe that crosses two or three of the upper abdominal segments. The shape differs from that of *Philodice*, in the attenuation of the head case and lesser prominence of the process; also in absence of the abdominal markings. This description however is given from the drawing.

COLIAS ALEXANDRA.—This species was found by Mr. Mead to be very common in certain localities in Colorado. "It was first observed about June 15th, when four males were taken near the South Park; elevation 9000 feet. On 21st, at Turkey Creek Junction, 27 ♂ and 7 ♀ were taken, all in fine condition. But one or two of the females were albinos, this variety being exceedingly rare. The last *Alexandra* was taken August 28th. The eggs were laid upon Lupinus."

From an egg sent me, a magnified drawing has been made by Mr. Konopicky. The shape is fusiform, like that of egg of *Eurytheme*, and it is longitudinally furnished with 18 or 20 ribs, between which throughout are transverse ribs of less prominence.

ARGYNNIS DIANA.—This butterfly continues to be the rarest of its genus. A few individuals appear about the first day of July, in Kanawha, when the milk-weeds (*Asclepia*) are in bloom, the flowers of which are very attractive to all butterflies. But it is only upon such patches of this plant as are near the

SUPPLEMENTARY NOTES.

forest that it need be looked for. My garden is on the river side not more than forty rods from the woods and planted with flowers in masses expressly to attract butterflies, Petunias, Single Zinnias, Phloxes, &c. At all times swarms of Papilios are to be seen, and when *Cybele* is in season it also abounds. But I do not recollect seeing more than one *Diana* there in years, and it flew about as if suspicious of the place and presently darted off to the woods again. On the 10th of July of the present year, (1872) when travelling over the James River and Kanawha Turnpike, in Fayette Co. W. Va., west of Big Sewell Mountain, in course of a drive of ten miles through the white-oak forest, I saw twenty-five or thirty fresh males, no doubt that morning emerged from chrysalis. They were on the road, either upon sand or on horse dung, solitary except in one instance, when I saw two together. So intent were they usually upon their own concerns that I was able to alight and approach them without much difficulty, and as I always have a net at hand when travelling, I succeeded in taking four specimens in beautiful condition. But if struck at and missed, they were alarmed and flew wildly up and down the road with surprising swiftness, and frequently in and out of the wood, so that it was useless to follow them. The same day, Mr. Julius Meyer, of Brooklyn, was in the vicinity and observed the same comparative abundance of individuals and their unusual gentleness and captured nine, (all males, no females being seen by either of us). But for several succeeding days, although he walked repeatedly over the same ground and over other roads in the neighborhood, he was not able to take a single one. They were too wary to be approached. Except in these instances I have scarcely ever known of a perfect male being taken by any collector, for the surface of the wings is sensitive to the slightest touch, and flying about the forest as is the habit of these insects, frequently in furious chase of each other, the wings become rubbed and broken. I doubt if a perfect specimen could be found the second day from chrysalis. This species is to be found here and there over a large extent of the Southern States, but it can nowhere be common. It seems irreclaimable by civilization, and as if in process of extinction.

I succeeded, in September 1869, in obtaining eggs from females enclosed with both violets and our common iron-weed (*Vernonia fasciculata*) and in course of a few days the larvæ were duly hatched. But they could be induced to eat nothing and shortly died.

Mr. Hayhurst, then at Sedalia, Missouri, afterwards wrote me that he had succeeded in raising one larvæ from some of these eggs that I had sent him, until it reached the second moult, when it died. This one fed on the leaves of the other species of *Vernonia* (*Noveboracensis*). Mr. Meyer suggests that the difficulty in raising *Argynnis* larvæ from the egg, is owing to the dryness of the breeding boxes. In a state of nature these larvæ feed in the forest, on low growing plants and in

SUPPLEMENTARY NOTES.

moist places, and in the absence of the proper conditions shrivel and die, dry up, in fact.

The eggs were sub-conic, more rounded at the base than eggs of *Cybele*, strongly ribbed vertically and horizontally.

ARGYNNIS CYBELE.—Mr. Wm. Saunders has described the larva and chrysalis of this species in the Canadian Entomologist for August, 1872. The larvæ were taken early in June, when just about to change to chrysalids, having gathered in some numbers under pieces of bark placed by Mr. Saunders near the edge of a wood and in the vicinity of patches of violets with the view of enticing the larvæ to take refuge thereunder when ready to change. By this happy thought the way is pointed out for obtaining the larva of any species of *Argynnis*. The eggs of *Cybele* I have myself obtained abundantly from females enclosed with plants of violet, but although they hatched, the larvæ refused to eat and soon died. These eggs are generically like those of *Aphrodite*, *Diana*, *Atlantis*, and several other species that I have procured in same manner. They are all sub-conic, resting on a broad base, furnished with strong vertical ribs which are strengthened by smaller cross ribs. The eggs of the several species differ mostly from each other in comparative height, breadth of base and curvature of sides. There is but one annual brood. In West Virginia, the eggs are deposited late in the season, in September, and as they hatch in fourteen days after, it is probable that the larvæ, after having moulted once or twice, stop feeding and pass the winter in a torpid state, ready to revive with the first approach of Spring.

ARGYNNIS HALCYONE.—Mr. Mead writes; "This species began to appear, 6th July, at Fairplay. It was frequently seen at Twin Lakes."

FEMALE. Expands 3 inches. Upper side paler fulvous than the male, the submarginal spots faded to sordid white; on under side the spots are well silvered.

ARGYNNIS EDWARDSII.—"Specimens were taken around Denver, June 1st, also on Turkey Creek and in the South Park, but none were seen at Twin Lakes, July 8th to 21st. A single much worn specimen was taken in the Middle Park, Aug. 12th. The second brood appears about the middle of August."

ARGYNNIS HESPERIS.—"This species was first found on Turkey Creek, June 24th, when four males were captured at wet places in the road. They were exceedingly shy. A few days after, several were taken high up on a mountain side where they were attracted by various flowers, especially Labiatae, and were then very accessible. With them were *Arg. Atlantis*."

SUPPLEMENTARY NOTES.

ARGYNNIS ATLANTIS.—I was much surprised at finding several *Atlantis* among Mr. Mead's collections. They were seen near Turkey Creek and also in the Arkansas Valley. A female in captivity deposited eggs on violets. The larva and chrysalis of *Atlantis* are described in Packard's Guide, p. 252.

ARGYNNIS APHRODITE.—Three specimens were obtained by Mr. Mead, varying somewhat from those found in the Atlantic States, in that the male approaches the female in style of coloring, having the deep ferruginous under side of secondaries and the fiery hue above that is seen in the females. It is a striking variation, and only after much consideration did I conclude that the species was *Aphrodite*. The females were very much as in eastern specimens. No *Cybele* was seen by Mr. Mead.

GRAPTA FAUNUS.—This species has been taken by Mr. Julius Meyer (July 1872) in Fayette Co. W. Va., the most southern locality as yet known to me.

LIMENITIS WEIDEMEYERII.—Of this species Mr. Mead says, "I found my first specimen on the banks of Turkey Creek, June 6th. No more were seen until 25th. It seems to be very local and is not found above the altitude at which willows flourish."

LIMENITIS PROSERPINA.—In his paper entitled "A Systematic Revision of the American Butterflies, &c." Report Peabody Acad. Sci. 1871, Mr. Scudder gives *Proserpina* as a synonym of *Ursula*, with which opinion I by no means agree. *Proserpina* seems to be confined to the mountain districts, and apart from the remarkable white band that characterises it, has a great resemblance to *L. Arthemis* in the coloring of the under surface and which *Ursula* has not. The only test of a species, next to the certain one of breeding it from the egg, is constancy to type, and when a particular form is found year after year, in any locality, the inference is irresistible that it perpetuates its own type and is therefore distinct. We call such form a species, without knowing more of its history than appears on the surface, and it is upon exactly this sort of evidence that half our species rest. If ever by breeding from the egg *Proserpina* shall be proved to be only a variety or dimorphous form of *Ursula*, the discovery will be most interesting, as well as convincing.

APATURA ALICIA.—In the paper above quoted, *Alicia*, together with *Celtis*, is given as synonym of *Lycaon*, Fab. It is possible that the former may be *Lycaon*, as seems to be the opinion of Mr. Butler, in Cat. Diur. Lep. of Brit. Mus. 1869. p. 57, but I cannot doubt its distinctness from *Celtis*, Bois. The figure of

SUPPLEMENTARY NOTES.

this last species in Boisduval and Leconte agrees well with the common *Apatura*, of West Virginia, the larva of which feeds on *Celtis occidentalis*. It is of an olivaceous brown quite different from the fulvous of *Alicia*, which species is very exactly represented on the plate. There are many other differences which may be seen on comparing the two plates in question. These species are allied, but no more nearly than *Comma* and *Faunus*, or many others that could be cited. In the notes on *Alicia* as first printed, the species was compared with *Olyton* by mistake for *Celtis*.

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DATES OF ISSUE OF PARTS 1-10.

- PART 1.—April, 1868.—Containing *Argynnis Diana*, *A. Cybele*, *A. Aphrodite*, *A. Nokomis*, *A. Atlantis*.
- PART 2.—August, 1868.—Containing *Argynnis Callippe*, *A. Hesperis*, *Colias Alexandra*, *C. Chippewa*, (*Helena*), *C. Behrii*, *C. Christina*, *Apatura Alicia*.
- PART 3.—December, 1868.—Containing *Argynnis Monticola*, *A. Halcyone*, *Limenitis Proserpina*, *Lycæna Violacea*, *L. Lygdamas*, *Thecla Læta*, *T. Acadica*.
- PART 4.—April, 1869.—Containing *Argynnis Leto*, *Colias Eurytheme*, *C. Keewaydin*, *Limenitis Weidemeyerii*, *Thecla Ontario*, *T. Strigosa*.
- PART 5.—December, 1869.—Containing *Argynnis Edwardsii*, *Colias Eurydice*, *Limenitis Lorquini*, *Grapta Faunus*, *Lycæna Pseudargiolus*, *L. Neglecta*.
- PART 6.—June, 1870.—Containing *Argynnis Behrensii*, *A. Zerene*, *Colias Edwardsii*, *Anthocaris Reakirtii*, *A. Cooperii*, *Limenitis Californica* (*Bredowii*.)
- PART 7.—January, 1871.—Containing *Parnassius Clarius*, *P. Clodius*, *Colias Occidentalis*, *Anthocaris Sara*, *Melitæa Chalcedon*, *Paphia Glycerium*.
- PART 8.—August, 1871.—Containing *Neophasia Menapia*, *Pieris Beckerii*, *P. Virginensis*, *P. Vernalis*, *Argynnis Nevadensis*, *Grapta Comma*, *G. Dryas*.
- PART 9.—December, 1871.—Containing *Papilio Ajax*, var. *Walshii*, var. *Telamonides*, var. *Marcellus*, *Grapta Interrogationis*, var. *Umbrosa*, var. *Fabricii*.
- PART 10.—July, 1872.—Containing *Parnassius Smintheus*, *P. Eversmanni*, *Grapta Satyrus*, *G. Zephyrus*, *Colias Meadii*, *C. Scudderii*.

SYNOPSIS
OF
NORTH AMERICAN BUTTERFLIES.

BY

WM. H. EDWARDS.
MEMBER OF THE AMERICAN ENTOMOLOGICAL SOCIETY.

PHILADELPHIA:
THE AMERICAN ENTOMOLOGICAL SOCIETY,
1872.

• AUTHORS AND WORKS QUOTED IN SYNOPSIS.

Abbot.—Insects of Georgia.	1797
Agassiz.—Lake Superior.	1850
American Entomologist, St. Louis.	1869—70
Annals of the New York Lyceum of Natural History.	—
Annals de la Societe Entomologique de France.	—
Behr.—Proceedings of the California Academy of Natural Sciences.	—
Boisduval.—Icones historique des Lepidopteres.	1833
“ Species general des Lepidopteres, I.	1836
“ Lepidopteres de la Californie.	1869
Boisduval and LeConte.—Lepidopteres de l’Amerique septentrionale.	1833
Butler.—Catalogue of Satyridæ in British Museum.	1868
Canadian Naturalist, V.	1857
Catalogue of the Museum of St. Petersburg.	1855—63
Cramer.—Papillons exotiques.	1779—82
Curtis.—Ross’s Arctic Expedition. Appendix.	1835
Doubleday, Hewitson & Westwood.—Genera of Diurnal Lepidoptera.	1846—52
Drury.—Illustrations of Exotic Entomology.	1770—82
D’Urban.—Canadian Naturalist, V.	—
Edwards.—Proceedings of the Academy of Natural Sciences, Philadelphia.	—
“ Proceedings of the Entomological Society of Philadelphia.	—
“ Transactions of the American Entomological Society.	—
“ Butterflies of North America.	1868—72
Entomologist’s Monthly Magazine, London.	—
Esper.—Die Europaischen Schmetterlinge.	1777—94
“ Die Auslandschen Schmetterlinge.	1785—98
Fabricius.—Systema Entomologiæ.	1775
“ Species Insectorum, II.	1781
“ Mantissa Insectorum, II.	1787
“ Entomologia Systematica, III.	1793
Felder.—Lepidopterologische Fragmente, Wien.	1859
“ Reise der Novara.	1867
Fischer.—Entomographie de la Russie.	1823—24
Fitch.—New York Agricultural Report, III.	1859

Freyer.—Neuere Beiträge zur Schmetterlingskunde.	1831—58
Geyer, in Hübner's Exotischer Schmetterlinge.	—
Godart.—Encyclopedie Methodique, IX.	1819
“ Duponchels' Supplement.	1832—42
Graslin.—Annals de la Societe Entomologique de France.	—
Gray.—Griffith's Animal Kingdom, XV.	1832
Grote and Robinson.—Annals N. Y. Lyceum of Natural History.	—
Guerin.—Iconographie de Regne Animal.	1844
Harris.—New England Farmer.	—
“ Insects of Massachusetts, 2nd edition.	1862
Herbst.—Natursystem, Schmetterlinge.	1800
Herrich-Schäffer.—Europäischen Schmetterlinge.	1847—50
Hewitson.—Illustrations of Lycænidae.	—
Hübner.—Sammlung Europäischer Schmetterlinge.	1793—1827
“ Sammlung Exotischer Schmetterlinge.	1816—24
“ Verzeichniss bekannter Schmetterlinge.	1816
“ Zutrage zur Sammlung Exotischer Schmetterlinge.	1818—25
Kirby.—Fauna Boreali-Americana, IV.	1837
Kirtland.—Silliman's American Journal, XIII.	1836
Lefebvre.—Annals de la Societe Entomologique de France.	—
Linnaeus.—Museum Ludovicæ Ulricæ Reginae.	1764
“ Systema Naturæ, II.	1767
“ Mantissa, I.	1777
Lucas.—Papillons Exotiques.	1835
Menetries.—Catalogue of the Museum of St. Petersburg.	—
“ Nouv. Mem. Soc. Imp. de Moscou.	—
Moschler.—Wiener Entomologische Monatschrift.	—
New England Farmer.	1829
New York Agricultural Reports, III.	1859
Nouvelle Memoires Societe Imperiale de Moscou, III.	—
Packard.—Guide to the Study of Insects.	1869
Parker.—American Entomologist.	1870
Poeys.—Centurie Lepidopteres de l'île de Cuba.	1832
“ Memorias sobre la Historia natural de la Isla de Cuba.	1851
Proceedings of the Entomological Society of Philadelphia.	—
“ “ California Academy of Natural Sciences.	—
“ “ Academy of Natural Sciences, Philadelphia.	—
“ “ Essex Institute, Salem, Mass.	—

Proceedings of the Boston Society of Natural History.	—
“ “ Zoological Society of London.	—
Rambur.—Faune Entomologique de l'Andalousie.	1838—39
Reakirt.—Proceedings of the Academy of Natural Sciences, Philadelphia.	—
“ Proceedings of the Entomological Society of Philadelphia.	—
Ridings.—Proceedings of the Entomological Society of Philadelphia.	—
Riley.—American Entomologist.	—
Ross.—Arctic Expedition, Appendix.	1835
Saunders.—Packard's Guide to Study of Insects.	—
Say.—American Entomology.	1824—28
Scudder.—Proceedings of the Boston Society of Natural History.	—
“ Proceedings of the Essex Institute.	—
“ Transactions of the Chicago Academy of Sciences.	—
Silliman's American Journal of Science and Arts, XIII.	1836
Smith.—Abbot's Insects of Georgia.	1797
Sommer.—Boisduval's Icones.	—
Stoll.—Supplementband zu Cramers Papillons exotiques.	1787—96
Swainson's Zoological Illustrations.	1820—21
Thunberg.—Dissertatio Insecta Suecica, II.	1791
Transactions of the American Entomological Society, Philadelphia.	—
“ “ Entomological Society of London.	—
“ “ Chicago Academy of Natural Sciences	—
Westwood.—Humphrey's British Butterflies.	1848
Wiener Entomologische Monatschrift.	—

SYNOPSIS
OF
NORTH AMERICAN BUTTERFLIES.

PAPILIONIDÆ.

PAPILIO, Linn.

1. PHILENOR, Linn. Mant. I. p. 535. Drury, Exot. Ins. I. pl. 11. Fabr. Syst. Ent. p. 445. Smith & Abbot, Ins. Geo. pl. 3. Godart, Enc. IX. p. 40. Say, Am. Ent. pl. 1. Bois. & Lec. pl. 11. Bois. Spec. Gen. p. 324.
Astinous, Cramer, pl. 208.
Hab.—Atlantic to Pacific.
2. VILLIERSII, Bois. Bois. & Lec. pl. 14. Bois. Spec. Gen. p. 325.
Devilliers, Godart, Enc. IX. p. 810.
Hab.—Florida; Cuba.
3. MACHAON, Linn. Syst. Nat. II. p. 750. Harris, Aurelian, pl. 36. Donovan, Brit. Ins. 6, pl. 211. Esper, Eur. Schmet. V. pl. 1. Humphreys, Brit. Ins. pl. 1. Bois. Spec. Gen. p. 328.
Hab.—Hudson Bay, Rupert House. (Coll. W. H. Edwards.)
4. ZOLICAON, Bois. Ann. Soc. Ent. France, 1852.
Hab.—California.
5. ASTERIAS, Drury, Exot. Ins. I. pl. 11. Cramer, pl. 385. Fabr. Mant. Ins. II. p. 2. Fabr. Ent. Syst. III. p. 6. Godart, Enc. IX. p. 58. Bois. & Lec. pl. 4. Bois. Spec. Gen. p. 332. Harris, Ins. Mass. p. 212.
Troilus, Smith & Abbot, Ins. Geo. pl. 1.
Var. *Calverleyii*, Grote, Proc. Ent. Soc. Phil. 1864, pl. 10.
Hab.—Atlantic and Western States; Canada; Colorado; New Mexico; Mexico.

6. INDRA, Reakirt, Proc. Ent. Soc. Phil. 1866.
Hab.—Colorado.
7. BAIRDII, Edwards, Proc. Ent. Soc. Phil. 1866.
Hab.—New Mexico.
8. TROILUS, Linn. Mus. Lud. Ulric. p. 187; Syst. Nat. II. p. 746. Drury, Exot. Ins. II. pl. 3. Fabr. Syst. Ent. p. 444. Cramer, pl. 207. Godart, Enc. IX. 60. Bois. & Lec. pl. 10. Bois. Spec. Gen. 334. *Ilioneus*, Smith & Abbot, Ins. Geo. pl. 2. Felder, Zool. Nov. Exped.
Hab.—Atlantic and Southern States.
9. PALAMEDES, Drury, Exot. Ins. I. pl. 19. Cramer, pl. 93. *Calchas*, Fabr. Syst. Ent. p. 453. Godart, Enc. IX. p. 59. Bois. & Lec. pl. 5. Bois. Spec. Gen. p. 337.
Hab.—Virginia to Florida; Gulf States.
10. TURNUS, Linn. Mant. Ins. I. p. 536. Fabr. Syst. Ent. p. 452; Sp. Ins. II. p. 16. Godart, Enc. IX. p. 55. Say, Am. Ent. III. pl. 40. Bois. & Lec. pl. 6, 7. Bois. Spec. Gen. p. 338. Lucas, Pap. Exot. var. ♂, pl. 18.
Alcidamas, Cramer, pl. 38.
 ♀ *Glaucus*, (black var.) Linn. Syst. Nat. II. p. 746. Cramer, pl. 139. Fabr. Syst. Ent. p. 445. Godart, Enc. IX. p. 60. Bois. & Lec. pl. 8, 9. Bois. Spec. Gen. p. 335.
Hab.—Atlantic, Gulf and Western States; British America, from Nova Scotia to Fort Simpson.
11. RUTULUS, Bois. Ann. Soc. Ent. Fr. 1852.
 Var.? *Albanus*, Felder, Zool. Nov. Exped.
Hab.—California; Colorado.
12. EURYMEDON, Bois. Ann. Soc. Ent. Fr. 1852.
Hab.—California; Washington Territory; Colorado.
13. PILUMNUS, Bois. Spec. Gen. p. 340. Menetries, Cat. Mus. St. Petersb. pl. 7.
Hab.—New Mexico.
14. DAUNUS, Bois. Spec. Gen. p. 342. Ridings, Proc. Ent. Soc. Phil. 1862, fig.
Hab.—Colorado; New Mexico.

15. *CRESPHONTES*, Cramer, pl. 165, 166. Bois. & Lec. pl. 12, 13. Bois. Spec. Gen. p. 355.
Hab.—Southern States; occasional in Illinois, Michigan, West Virginia, Ontario.
16. *MARCELLUS*, Bois. Bois. & Lec. pl. 2. Bois. Spec. Gen. p. 257.
Hab.—Atlantic States to Philadelphia; Southern and Western States.
17. *AJAX*, Linn. Syst. Nat. II. p. 750. Fabr. Syst. Ent. p. 455. Cramer, pl. 98. variety. Smith & Abbot, Ins. Geo. pl. 4. Godart, Enc. IX. p. 53. Bois. & Lec. pl. 1. Bois. Spec. Gen. p. 258.
 Var.? *Telamonides*, Felder, Zool. Nov. Exped.
Hab.—Co-extensive with *Marcellus*.
18. *SINON*, Fabr. Syst. Ent. p. 452. Cramer, pl. 317. Godart, Enc. IX. p. 53. Bois. & Lec. pl. 3. Bois. Spec. Gen. p. 260.
Protesilaus, Drury, Exot. Ins. I. pl. 22.
Hab.—Florida; Cuba.
19. *MINONA*, Reakirt, MS., Proc. Acad. Nat. Sciences, 1869, (ined.)
Hab.—Jackson Co., Florida.
20. *POLYDAMAS*, Linn. Mus. Lud. Ulric. p. 192. Drury, Exot. Ins. I. pl. 17. Cramer, pl. 211. Fabr. Sp. Ins. II. p. 8; Ent. Syst. I. p. 14. Godart, Enc. IX. p. 39. Bois. & Lec. pl. 15. Bois. Spec. Gen. p. 321.
Hab.—Florida; Cuba; Mexico.

PARNASSIUS, Latreille.

1. *CLARIUS*, Eversman, Bull. Mosc. XVI. pl. 9. Bois. Ann. Soc. Ent. Fr. 1852.
Hab.—California.
2. *SMINTHEUS*, Doubleday, Diurnal Lepidoptera, I. pl. 4*. Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—California.
3. *SAYII*, Edwards, ♀, Proc. Ent. Soc. Phil. 1863.
 ? Var. *Smintheus*, Reakirt, Proc. Ent. Soc. Phil. 1867.
 ? *Nomion*, Fischer, Ent. de la Russ. II. pl. 6. Bois. Icon. pl. 4. Bois. Spec. Gen. p. 397, pl. 6.
Hab.—Colorado.

LEPTALIS, Dalman.

1. MELITE, Linn. Syst. Nat. II. p. 755. Cramer, pl. 153. Fabr. Ent. Syst. III. 1, 160. Swainson, Zool. Illust. 1st ser., pl. 22. Bois. Spec. Gen. p. 422.
Hab.—New Mexico.

NEOPHASIA, Behr.

1. MENAPIA, Felder, Wiener Ent. Monats. III. p. 271.
Hab.—Utah, California.
2. TERLOOII, Behr, Trans. Amer. Ent. Soc. 1869.
Hab.—California.

PIERIS, Schrank.

1. OLERACEA, Bois. Spec. Gen. 518. Scudder, Proc. Bost. Soc. Nat. Hist. 1861.
Pontia oleracea, Harris, New England Farmer, VIII, 402; Ins. Mass. p. 213; Agassiz Lake Superior, pl. 7.
Casta, Kirby, Fauna Bor. Am. IV. pl. 3.
Pieris cruciferarum, Bois. Spec. Gen. 519.
Hab.—Eastern States, West Virginia, Colorado, Montana, Canada, British America, to Mackenzie's River.
2. FRIGIDA, Scudder, Proc. Bost. Soc. Nat. Hist. 1861.
Hab.—Labrador.
3. CASTORIA, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—California.
4. RAPAE, Linn. Syst. Nat. II. 759. Bois. Spec. Gen. 520. Humphreys, Brit. Ins. pl. 5.
Hab.—Ontario, Maine, Vermont.
5. YREKA, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—California.
6. VENOSA, Scudder, Proc. Bost. Soc. Nat. Hist. 1861.
Hab.—California.
7. MARGINALIS, Scudder, Proc. Bost. Soc. Nat. Hist. 1861.
Hab.—California, Gulf of Georgia.
8. PALLIDA, Scudder, Proc. Bost. Soc. Nat. Hist. 1861.
Hab.—Gulf of Georgia.

9. *PROTODICE*, Bois. & Lec. pl. 17. Bois. Spec. Gen. 543. Scudder, Proc. Bost. Soc. Nat. Hist. 1861.
Hab.—Southern, Middle and Western States; Colorado; California.
10. *OCCIDENTALIS*, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—Colorado; California.
11. *SISYMBRI*, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California.
12. *VERNALIS*, Edwards, Proc. Ent. Soc. Phil. 1864.
Hab.—New Jersey; Pennsylvania; West Virginia; Missouri; Colorado.
13. *TAU*, Scudder, Proc. Bost. Soc. Nat. Hist. 1861.
Hab.—California; Oregon; British Columbia.
14. *MONUSTE*, Linn. Mus. Lud. Ulric. p. 237; Syst. Nat. II. 760. Fabr. Syst. Ent. p. 470; Ent. Syst. III. p. 189. Godart, Enc. Meth. IX. p. 141. Bois. Spec. Gen. I. p. 495.
Cleomes, Bois. & Lec. p. 43, pl. 16.
Orseis, Godart, Enc. Meth. IX. p. 141.
Hab.—Southern States.

NATHALIS, Boisduval.

1. *IOLE*, Boisduval, Spec. Gen. I. p. 589.
Var. *Irene*, Fitch, 3rd. New York Report, p. 167.
Hab.—Missouri to Texas.

ANTHOCARIS, Boisduval.

1. *GENUTIA*, Fabricius, Ent. Syst. III. 1. 193. Godart, Enc. Meth. IX. p. 168.
Bois. Spec. Gen. 1. 565.
♀. *L'hermineri*, Godart, Enc. Meth. IX. p. 168.
Hab.—New York to Virginia; Middle and Western States; Texas.
2. *CREUSA*, Doubleday, Gen. Diur. Lep. pl. 7.
Hab.—Rocky Mountains; Missouri.
3. *AUSONOIDES*, Boisduval, (in description of *A. Sara*.) Ann. Ent. Soc. Fr. 1852.
Edwards, Proc. Ent. Soc. Phil. 1863.
Hab.—California.

4. LANCEOLATA, Boisduval, Ann. Ent. Soc. Fr. 1852.

Hab.—California.

5. SARA, Boisduval, Ann. Ent. Soc. Fr. 1852.

Hab.—California.

6. COOPERII, Behr, Trans. Am. Ent. Soc. 1869.

Hab.—San Diego, California.

7. EDWARDSII, Behr, Trans. Am. Ent. Soc. 1869.

Hab.—California.

CALLIDRYAS, Boisduval.

1. ARGANTE, Fabr. Syst. Ent. p. 470; Ent. Syst. III. 1. 189. Godart, Ent. Meth. IX. p. 92. Bois. Spec. Gen. I. 622.

♂. *Hersilia*, Cramer, pl. 173.♀. *Cypria*, Cramer, pl. 99.♀. *Cnidia*, Godart, Enc. Meth. IX. p. 93.Var. *Agarithe*, Roger, Bois. Spec. Gen. I. 623.*Hab.*—Texas; Florida, (Coll. Edwards.)

2. CYPRIA, Fabr. Ent. Syst. III. 1. 212. Godart, Enc. Meth. IX. p. 91. Bois. Spec. Gen. I. p. 623.

Hab.—New Mexico.

3. EUBULE, Linn. Syst. Nat. II. p. 764. Fabr. Syst. Ent. p. 477; Ent. Syst. III. 1. 209. Cramer, pl. 120. Abbot, Ins. Geo. pl. 5. Bois, Spec. Gen. I. p. 613. Bois. & Lec. p. 74.

Var. ♂. *Sennæ*, Linn. Syst. Nat. II. p. 764. Fabr. Syst. Ent. p. 477.*Hab.*—Southern States; Illinois; occasional in Ohio (Kirtland); West Virginia; Long Island, (Akhurst).

4. MARCELLINA, Cramer, pl. 163. Fabr. Sp. Ins. II. p. 49; Ent. Syst. III. 1. 209. Godart, Enc. Meth. IX. p. 92. Bois. Spec. Gen. I. p. 615. Bois. & Lec. p. 74, pl. 24.

Hab.—Southern States.

GONEPTERYX, Leach.

1. CLORINDE, Godart, Enc. Meth. IX. p. 813.

Rhodocera clorinde, Bois. Spec. Gen. I. 599. Doubleday, Gen. Diurnal Lep. p. 71.*Hab.*—New Mexico.

2. *MÆRULA*, Fabr. Syst. Ent. p. 479; Ent. Syst, III. 1. 212. Godart, Enc. Meth. IX. p. 89. Bois. & Lec. p. 71, pl. 23. Bois. Spec. Gen. I. p. 600.
Ecclipsis, Cramer, pl. 129.
Hab.—Florida; Texas; New Mexico.

3. *LYSIDE*, Godart, Enc. Meth. IX. p. 98.
Rhod. Lyside, Bois. Spec. Gen. I. p. 603.
Hab.—Texas; New Mexico.

COLIAS, Fabricius.

1. *EURYDICE*, Boisduval, Ann. Ent. Soc. Fr. 1852, p. 32. Edwards, Butterflies of North America, pl. V of Colias.
Wosnesenski, Menetries, Cat. Acad. Sci. St. Petersburg. 1855
 ♀. *Rhodocera Lorquinii*, Bois. Ann. Ent. Soc. Fr. 1852.
Hab.—California; Oregon.
2. *CÆSONIA*, Stoll. Suppl. Cramer, pl. 41. Godart, Enc. Meth. IX. p. 98. Bois. & Lec. p. 67, pl. 22. Bois. Spec. Gen. I. p. 635.
Hab.—Southern and Western States.
3. *EURYTHEME*, Bois. Ann. Ent. Soc. Fr. 1852. Edwards, Butterflies of North America, pl. III of Colias.
 Var. *Amphidusa*, Bois. Ann. Ent. Soc. Fr. 1852.
Edusa, var. *Californica*, Menetries, Cat. Acad. Sci. St. Petersburg, 1855.
Hab.—Southern, Western and Pacific States.
4. *KEEWAYDIN*, Edwards, Butterflies of North America, pl. IV of Colias.
Hab.—Southern, Western and Pacific States; occasional in Middle States and Canada.
5. *CHRISTINA*, Edwards, Proc. Ent. Soc. Phil. 1863; Butterflies of North America, pl. II of Colias.
Hab.—Great Slave Lake.
6. *ARIADNE*, Edwards, Proc. Ent. Soc. Phil. 1870.
Hab.—Oregon.
7. *HECLA*, Lefebvre, Ann. Ent. Soc. Fr. 1836, p. 383.
Hab.—Disco Island; Greenland.

8. BOOTHII, Curtis, Appendix Ross' Arctic Explorations, Nat. Hist. pl. A p. 65.
 Var. *Chione*, Curtis. Ross' Arc. Exp. p. 66.
 Hab.—Boreal America.
9. OCCIDENTALIS, Scudder, Proc. Bost. Soc. Nat. Hist. 1862.
 Hab.—Gulf of Georgia; M'Kenzies River.
10. ALEXANDRA, Edwards, Proc. Ent. Soc. Phil. 1863; Butterflies of North America, pl. I of Colias.
 Hab.—Colorado; Rocky Mountains.
11. EMILIA, Edwards, Trans. Am. Ent. Soc. Phil. 1870.
 Hab.—California.
12. EDWARDSII, Behr, Butterflies of North America, pl. VI of Colias.
 Hab.—California.
13. PHILODICE, Godart, Enc. Meth. IX. p. 100. Bois. & Lec. p. 64, pl. 21.
 Bois. Spec. Gen. I. p. 647.
 Var. *Anthyale*, Hubner, Zutr. p. 307.
 Hab.—Atlantic States; Mississippi Valley; Canada.
14. INTERIOR, Scudder, Proc. Bost. Soc. Nat. Hist. 1862.
 Hab.—Hudson's Bay; Lake Superior.
15. CHIPPEWA, Edwards.
 Helena (pre-occupied) Edwards, Proc. Ent. Soc. Phil. 1863. Butterflies of North America, pl. I of Colias.
 Hab.—Great Slave Lake.
16. SCUDDERII, Reakirt, Proc. Ent. Soc. Phil. 1867.
 Hab.—Colorado.
17. NASTES, Bois. Icon. pl. 8. Godart, Dupon. Suppl. pl. 15.
 Hab.—Labrador.
18. PALENO, Linn. Syst. Nat. II, p. 764. Fabr. Syst. Ent. p. 476; Ent. Syst. III, p. 207. Esper, Eur. Schmett. pl. 42. Bois. Spec. Gen. I, p. 645.
 Hab.—Labrador.

- 19 *PELIDNE*, Boisduval, Icones, pl. 8, 1832. Bois. & Lec. p. 66, pl. 21.
Labradorensis, Scudder, Proc. Bost. Soc. Nat. Hist. 1862.
Hab.—Labrador.
20. *BEHRII*, Edwards, Proc. Ent. Soc. Phil. 1866; Butterflies of North America,
 pl. II of *Colias*.
Hab.—California: Yo Semite Mountains.
- TERIAS, Swainson.
1. *NICIPPE*, Cramer, III. pl. 210. Fabr. Ent. Syst. III. p. 208. Godart, Enc.
 Meth. IX. p. 103. Say, Am. Ent. II. p. 70, pl. 30. Bois. & Lec.
 p. 55, pl. 20. Bois. Spec. Gen. I. p. 653.
Hab.—Pennsylvania to Gulf of Mexico; Mississippi Valley.
2. *PROTERPIA*, Fabricius, Sp. Ins. II. p. 50; Syst. Ent. p. 478. Godart, Enc.
 Meth. IX. p. 91. Bois. Spec. Gen. I. p. 654.
Hab.—Texas; New Mexico.
3. *MEXICANA*, Boisduval, Spec. Gen. I. p. 655, pl. 3.
Hab.—Texas; New Mexico.
4. *MIDEA*, Menetries, Nouv. Mem. Soc. Imp. Mosc. III. pl. II. Bois. Spec. Gen.
 I. p. 659.
Hab.—California (according to Menetries).
5. *LISA*, Boisduval, Bois. & Lec. p. 53, pl. 19. Bois. Spec. Gen. I. p. 661.
Pieris smilax, Godart, Enc. Meth. IX. p. 136.
Hab.—Rhode Island to Gulf of Mexico; Western States.
6. *DELIA*, Cramer, Ins. IV. pl. 273. Godart, Enc. Meth. IX. p. 137. Bois. &
 Lec. p. 49, pl. 18. Bois. Spec. Gen. I. p. 663.
Hab.—Florida to Louisiana.
7. *JUCUNDA*, Boisduval, Bois. & Lec. p. 52, pl. 19. Bois. Spec. Gen. I. p. 665,
Hab.—Southern States.
8. *ELATHEA*, Cramer, Ins. II. pl. 99. Fabr. Sp. Ins. II. p. 44; Ent. Syst. III.
 p. 196. Godart, Enc. Meth. IX. p. 136. Bois. Spec. Gen. I. p.
 664.
Hab.—Florida.

9. *PALMIRA*, Poey, Mem. Nat. Hist. de la Isla de Cuba, I. p. 249.
Hab.—St. Simon's Island, Georgia.

HELICONIADÆ.

ITHOMIA, Doubleday.

1. *DIAPHANA*, Drury, Ins. II, pl. 7. Cramer, Ins. III. pl. 231.
Hab.—Florida; Louisiana.

CALLITHOMIA, Bates.

1. *LYCASTE*, Fabr. Ent. Syst. III, p. 161. Godart, Enc. Meth. IX, p. 221. Reakirt, Proc. Ent. Soc. Phil. 1865.
Hab.—Los Angeles, California.

MECHANITIS, Fabricius.

1. *CALIFORNICA*, Reakirt, Proc. Ent. Soc. Phil. 1865.
Hab.—Los Angeles, California.

HELICONIA, Latreille.

1. *CHARITONIA*, Linn. Syst. Nat. II, p. 757. Cramer, Ins. II, pl. 191. Fabr. Ent. Syst. III, p. 170. Godart, Enc. Meth. IX, p. 210. Bois & Lec. p. 140, pl. 41.
Hab.—Florida; St. Simon's Island, Georgia.

NYMPHALIDÆ.

AGRAULIS, Blanchard.

1. *VANILLÆ*, Linn. Syst. Nat. II, p. 787. Cramer, Ins. III, p. 212. Fabr. Mant. Ins. II, p. 64. Godart, Enc. Meth. IX, p. 262. Bois. & Lec. p. 143, pl. 42.
Passifloræ, Fabr. Ent. Syst. III, p. 60.
Hab.—Southern States.

SYNCHLOE, Boisduval.

1. *JANAIS*, Drury, Exot. Ins. III, pl. 17. Godart, Enc. Meth. IX, p. 392.
Hab.—Texas.
2. *SAUNDERSII*, Doubleday, Gen. Diur. Lep. pl. 24.
Hab.—Texas.

3. *ERODYLE*, Bates, Entomologist's Monthly Magazine, I. p. 84, 1864.
Hab.—Texas.

AGERONIDÆ.

AGERONIA, Hubner.

1. *FERONIA*, Linnæus, Mus. Uhl. p. 283; Syst. Nat. p. 770. Drury, I. pl. 10.
 Cramer, Ins. II. p. 192. Fabr. Ent. Syst. III. p. 226. Godart,
 Enc. Meth. IX. p. 428.
Hab.—Texas.
2. *FORNAX*, Hubn. Samml. Exot. Schmett. Doubl. & Hewit. Gen. Diur. Lep. pl. 10.
Hab.—Texas.

DANAIS, Latreille.

1. *ARCHIPPUS*, Cramer, Ins. III. pl. 206. Godart, Enc. Meth. IX. p. 184. Bois.
 & Lec. p. 137, pl. 40.
Missippus, Fabr. Mant. Ins, II. p. 27; Ent. Syst. III. p. 50.
Nec Archippus, Fabr. Ent. Syst. III. p. 50.
Hab.—From Atlantic to Pacific.
2. *BERENICE*, Cramer, Ins. III. pl. 205. Bois. & Lec. p. 134, pl. 39.
Erippus, Fabr. Ent. Syst. I. p. 49. Godart, Enc. Meth. IX. p. 186.
Gilippus, Abbot, Ins. Geo. I. pl. 7.
Hab.—Southern States; New Mexico.
3. *STRIGOSA*, Bates, Entomologist's Monthly Magazine, I. p. 32, 1864.
Hab.—Texas.

EUPTOIETA, Doubleday.

1. *CLAUDIA*, Cramer, I, pl. 69.
Columbina, Fabr. Ent. Syst. III, p. 148. Godart, Enc. Meth. IX, p. 260.
 Bois. & Lec. p. 153, pl. 44.
Hab.—Long Island to Gulf of Mexico; Mississippi Valley; New
 Mexico.

ARGYNNIS, Fabricius.

1. *DIANA*, ♂ Cramer, pl. 98. ♂ Fabr. Sp. Ins. p. 110; Ent. Syst. III. p. 145.
 ♂ Godart, Enc. Meth. IX. p. 257. ♂ Say. Am. Ent. I. pl. 17.
 ♂ Bois. and Lec. p. 149. ♀ Edwards, Proc. Ent. Soc. Phil. 1864;
 ♂ ♀ Butterflies of North America, pl. I of *Argynnis*.
Hab.—West Virginia to Georgia; Arkansas.

2. IDALIA, Drury, Exot. Ins. pl. 13. Cramer, pl. 44. Fabr. Syst. Ent. p. 516; Ent. Syst. III. p. 145. Godart, Enc. Meth, IX. p. 263. Bois. and Lec. p. 147, pl. 43. Harris, Ins. Mass. p. 285, 1862.
Hab.—Massachusetts to Arkansas.
3. LETO, Behr, Proc. Cal. Acad. Nat. Sci. 1862. Edwards, Butterflies of North America, pl. X of Argynnis.
? *Cybele*, Bois. Lep. de la Cal. 1869.
Hab.—California; Oregon.
4. NOKOMIS, ♂ Edwards, Proc. Acad. Nat. Sci. Phil. 1862; ♂ Butterflies of North America, pl. IV of Argynnis.
Hab.—Bitter Root Mountains, Montana.
5. CYBELE, Fabr. Syst. Ent. p. 516; Ent. Syst. III. p. 445. Godart, Enc. Meth. IX. p. 263. Bois. and Lec. p. 151, pl. 45. Edwards, Butterflies of North America, pl. II of Argynnis.
? *Daphne*, Cramer, pl. 57.
Hab.—Atlantic and Western States; Canada.
6. APHRODITE, Fabr. Mant. Ins. 2, p. 62; Ent. Syst. III. p. 144. Harris, Ins. Mass. p. 285, 1862. Edwards, Butterflies of North America, pl. III of Argynnis.
Hab.—Northern and Middle States; West Virginia; Canada.
7. BEHRENSII, Edwards, Butterflies of North America, pl. XII of Argynnis.
Hab.—Cape Mendocino, California.
8. HALCYONE, ♂ Edwards, Butterflies of North America. pl. IX of Argynnis.
Hab.—Colorado.
9. CORONIS, Behr, Proc. Cal. Acad. Nat. Sci. 1862. Edwards, Proc. Ent. Soc. Phil. 1864.
Juba, Bois. Lep. de la Cal. 1869.
Hab.—California.
10. CALLIPPE, Bois. Ann. Ent. Soc. Fr. 1852. Behr. Proc. Cal. Acad. Nat. Sci. 1862. Edwards, Butterflies of North America, pl. VI of Argynnis.
Hab.—California.

11. EDWARDSII, Reakirt, Proc. Ent. Soc. Phil. 1869. Edwards, Butterflies of North America, pl. XI of Argynnis.
Hab.—Colorado; Rocky Mountains.
12. NEVADENSIS, Edwards, Trans. Am. Ent. Soc. 1870; Butterflies of North America, pl. XIV of Argynnis.
Hab.—Nevada.
13. ATLANTIS, Edwards, Proc. Acad. Nat. Sci. Phil. 1862; Butterflies of North America, pl. V of Argynnis.
Hab.—Catskill Mountains; White Mountains; Nova Scotia; British America.
14. RUPESTRIS, Behr, Proc. Cal. Acad. Nat. Sci. 1862, 1863.
Hab.—Sierra Nevada, California.
15. MONTIVAGA, Behr, Proc. Cal. Acad. Nat. Sci. 1862, 1863.
Egleis, Bois. Lep. de la Cal. 1869
Hab.—California.
16. ASTARTE, Doubleday, Gen. Diur. Lep. pl. 23; Edwards, Proc. Ent. Soc. Phil. 1862.
Hab.—California.
17. ZERENE, Bois. Ann. Soc. Ent. de Fr. 1852. Behr, Proc. Cal. Acad. Nat. Sci. 1862, 1863. Edwards, Butterflies of North America, pl. XIII of Argynnis.
Hydaspes, Bois. Lep. de la Cal. 1869.
Hab.—California.
18. MONTICOLA, Behr, Proc. Cal. Acad. Nat. Sci. 1862, 1863. Edwards, Butterflies of North America, pl. VIII of Argynnis.
Zerene, Boisduval, Ann. Soc. Ent. de Fr. 1852.
Hab.—California; Oregon.
19. HESPERIS, Edwards, Proc. Ent. Soc. Phil. 1864; Butterflies of North America, pl. VII of Argynnis.
Hab.—Colorado.
20. ADIANTE, Bois. Lep. de la Cal. 1869. Behr (without name), Proc. Cal. Acad. Nat. Sci. 1862.
Hab.—California.

21. MYRINA, Cramer, pl. 189. Fabr. Sp. Ins. p. 109; Ent. Syst. III, p. 145.
Say, Am. Ent. pl. 46. Kirby, Fauna Bor. IV. p. 290. Harris,
Ins. Mass. p. 286, 1862.
Myrissa, Godart, Enc. Meth. IX, p. 268.
Hab.—Northern States; Canada; California.
22. MONTINUS, Scudder, Proc. Essex Ins. 1863; Proc. Bost. Soc. Nat. Hist. 1863.
Hab.—White Mountains.
23. MORRISII, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—Oregon.
24. TRICLARIS, Hubner, Exot. Schmett. Moschler, Wein Ent. Monat. 1866.
Ossianus, Bois. Icones pl. 19. Bois. & Lec. p. 157.
Hab.—Labrador; Fort Simpson; Boreal America.
25. FRIGGA, Thunberg, Dissert. II. p. 47. Moschler, Wein. Ent. Monat. 1866.
Hab.—Labrador.
26. POLARIS, Boisduval, Icones pl. 20. Bois. & Lec. p. 159. Moschler, Wein.
Ent. Monat. 1866.
Hab.—Labrador.
27. FREYA, Esper. Eur. Schmett pl. 109. Godart, Enc. Meth. IX, p. 273. Bois.
Icones, pl. 19. Kirby, Fauna Bor. p. 391. Moschler, Wein.
Ent. Monat. 1866.
Hab.—Labrador.
28. CHARICLEA, Herbst. pl. 272. Bois. & Lec. p. 161. Bois. Spec. Gen. p. 11.
Hab.—Labrador; Hudsons Bay.
29. BOISDUVALII, Sommer, Bois. Icones pl. 20.
Hab.—Labrador; Hudsons Bay; Boreal America.
30. NENOQUIS, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Mormonia, Boisduval, Lep. de la Cal. 1869.
Hab.—Rocky Mountains; Oregon.
31. BELLONA, Fabr. Syst. Ent. p. 517. Godart, Enc. Meth. IX. p. 271. Bois. &
Lec. p. 164, pl. 45. Harris, Ins. Mass. p. 287, 1862.
Hab.—Northern States; Canada; California.

32. EPITHORE, Bois., Edwards, Proc. Ent. Soc. Phil. 1864. Bois. Lep. de la Cal. 1869.
Hab.—California.

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33. BISCHOFFII, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Aliaska.

MELITÆA, Fabricius.

Group I.

1. PHAETON, Drury, Exot. Ins. I. pl. 21. Cramer, pl. 183. Fabr. Syst. Ent. p. 481. Ent. Syst. III, p. 46. Bois. & Lec. p. 166, pl. 47. Harris, Ins. Mass. p. 288, 1862.
Phaetontea, Godart, Enc. Meth. IX. p. 288.
Hab.—Eastern and Middle States; West Virginia.
2. CHALCEDON, Doubleday, Gen. Diur. Lep. pl. 23. Edwards, Proc. Ent. Soc. Phil. 1862. Butterflies of North America, pl. I of Melitæa.
Hab.—California; Oregon; Colorado (Reakirt).
3. COOPERII, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
Hab.—California.
4. ANICIA, Doubleday, Gen. Diur. Lep. pl. 23. Edwards, Proc. Ent. Soc. Phil. 1862. Bois. Lep. de la Cal. 1869.
Hab.—Rocky Mountains; Nevada; California.
5. EDITHA, Boisduval, Ann. Soc. Ent. de Fr. 1852.
Anicia, Boisduval, Lep. de la Cal. 1869.
Hab.—Vicinity of San Francisco.
6. STEROPE, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Oregon.
7. HELVIA, Scudder, Proc. Bost. Soc. Nat. Hist. 1869.
Hab.—Aliaska.
8. QUINO, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
Hab.—Southern California.
9. NUBIGENA, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
Hab.—Tuolumne River, California.

Group II.

10. *LEANIRA*, Felder. Lep. Frag. Wein. 1859. Behr, Proc. Cal. Acad. Nat. Sci. 1863. Bois. Lep. de la Cal. 1869.
Hab.—Yo Semite, Contra Costa, California.
11. *THEKLA*, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Southern California.
12. *THEONA*, Menetries, Enum. Corp. Anim. Acad. St. Petersburg, 1, p. 86, pl. 2.
Hab.—Southern California.

Group III.

13. *PALLA*, Bois. Ann. Soc. Ent. Fr. 1852. Behr, Proc. Cal. Acad. Nat. Sci. 1863.
Hab.—Vicinity of San Francisco.
14. *WHITNEYI*, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
Hab.—Tuolumne River, Lake Tahoe, California.
15. *GABBII*, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
Sonoræ, Bois. Lep. de la Cal. 1869.
Hab.—Los Angeles, California.
16. *HOFFMANNI*, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
Helcita, Bois. Lep. de la Cal. 1869.
Hab.—Lake Tehoe, California ; Nevada.

Group IV.

17. *MINUTA*, Edwards, Acad. Nat. Sci. Phil. 1861.
Hab.—Texas.
18. *ARACHNE*, Edwards, Trans. Am. Ent. Soc. 1869.
Pola, Bois. Lep. de la Cal. 1869.
Hab.—Colorado.

PHYCIODES, Hubner.

1. *HARRISII*, Scudder. Proc. Essex. Ins. 1863.
Ismeria, Harris, Ins. Mass. p. 288, 1862. ?*Ismeria*, Bois. & Lec. p. 168, pl. 46.
Hab.—Eastern and Middle States ; Miss. Valley.
2. *NYCTEIS*, Doubleday, Gen. Di. Lep. pl. 23.
Enone, Scudder, Proc. Essex. Ins. 1863.
Hab.—Eastern and Middle States ; Missouri ; Colorado.

3. CARLOTA, Reakirt, Proc. Ent. Soc. Phil. 1867.
 Nycteis, Edwards, Proc. Acad. Nat. Sci. Phil. 1861.
 Hab.—West Virginia to Missouri; Colorado.
4. PACKARDII, Saunders, Packard's Guide, p. 256, 1869.
 Hab.—Grimsby, Canada.
5. THAROS, Bois. & Lec. p. 170, pl. 47. (Not of Cramer, nor of Drury, vide Edw.
 Trans. Am. Ent. Soc. 1868.) Harris, Ins. Mass. p. 289, 1862.
 Hab.—Northern, Middle, Eastern States; Miss. Valley; Colorado.
6. PHAON, Edwards, Proc. Ent. Soc. Phil. 1864.
 ? *Tharos*, Drury and Cramer.
 Hab.—Georgia to Louisiana.
7. MARCIA, Edwards, Trans. Am. Ent. Soc. 1868.
 ? *Tharos*, Drury and Cramer.
 Hab.—Middle and Eastern States.
8. BATESII, Reakirt, Proc. Ent. Soc. Phil. 1865.
 Hab.—Virginia; West Virginia.
9. MONTANA, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
 Hab.—Lake Tehoe, California.
10. MATA, Reakirt, Proc. Ent. Soc. Phil. 1867.
 Hab.—Colorado.
11. PALLIDA, Edwards, Proc. Ent. Soc. Phil. 1864
 Hab.—Kansas; Texas.
12. TEXANA, Edwards, Proc. Ent. Soc. Phil. 1863.
 Hab.—Texas.
13. PICTA, Edwards, Proc. Ent. Soc. Phil. 1864.
 Hab.—Nebraska; Colorado.
14. MYLITTA, Edwards, Proc. Acad. Nat. Sci. Phil. 1861.
 Collinsia, Behr, Proc. Cal. Acad. Nat. Sci. 1863.
 Collina, Bois. Lep. de la Cal. 1869.
 Hab.—California.

15. PRATENSIS, Behr, Proc. Cal. Acad. Nat. Sci. 1863.

Epula, Bois., Lep. de la Cal. 1869.

♀, *Campestris*, Behr, Proc. Cal. Acad. Nat. Sci. 1863.

Hab.—California.

16. ORSA, Boisduval, Lep. de la Cal. 1869.

Hab.—California.

17. VESTA, Edwards, Trans. Am. Ent. Soc. 1869.

Hab.—Waco, Texas.

ERESIA, Doubleday.

1. CINCTA, Edwards, Proc. Ent. Soc. Phil. 1864.

Hab.—Texas.

2. PUNCTATA, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—New Mexico.

SYNCHLOE, Boisduval.

1. JANAIS, Drury, Ins. III, pl. 17. Godart, Enc. Meth. IX, p. 392.

Hab.—Texas.

2. SAUNDERSII, Doubleday, Gen. Diur. Lep. pl. 24.

Hab.—Texas.

3. ERODYLE, Bates, Entomologist's Monthly Magazine, I. p. 84, 1864.

Hab.—Texas.

4. LACINIA, Hubner, Zutrage, f. 899.

Hab.—Waco, Texas.

CYSTINEURA, Boisduval.

- DORCAS, Fabr., Syst. Ent. p. 508, (1775).

Mardania, Cramer, pl. 213, (1782). Doubleday, Gen. Diur. Lep. pl. 31.

Hersilia, Fabr. Ent. Syst. III. p. 247, (1793).

Hab.—Waco, Texas.

GRAPTA Doubleday.

1. FABRICII, Edwards, Trans. Am. Ent. Soc. 1870. ♂ ♀.
C-Aureum, Cramer, pl. 19, ♂. Fabr. Sp. Ins. p. 94, ♂; Ent. Syst. III, p. 78 ♂. Abbot, Ins. Ga. pl. 11. ♂.
Interrogationis, Godart, Enc. Meth. IX, p. 301 ♂; ibid. p. 819, var. ♂. Harris, Ins. Mass. fig. 124, 1862. Lintner, Trans. Am. Ent. Soc. 1869, ♂ ♀.
Hab.—From Gulf of Mexico to Canada; Mississippi Valley.
2. INTERROGATIONIS, Fabr. Supp. p. 424 ♀. Godart, Enc. Meth. IX, p. 301 ♀. Harris, Ins. Mass, p. 298, 1862.
C-aureum, Bois. & Lec. p. 192, ♀, pl. 51, ♂.
Umbrosa, Lintner, Trans. Am. Ent. Soc. 1870. ♂ ♀.
Hab.—Same as that of the preceding species.
3. DRYAS, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—W. Va.; New York.
4. COMMA, Harris, Ins. Mass. 1st Ed. p. 221; 2d Ed. p. 300, pl. 4.
Hab.—Northern and Middle States; West Va.; Iowa; Canada.
5. SATYRUS, Edwards, Trans. Am. Ent. Soc. 1869.
Hab.—Rocky Mts.; Colorado.
6. MARSYAS, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—California.
7. FAUNUS, Edwards, Proc. Acad. Nat. Sci. Phil. 1862; ibid. Butterflies of North America, pl. 1 of Grapta.
Hab.—Catskill Mts.; White Mts.; Canada.
8. OREAS, Edwards, Trans. Am. Ent. Soc. 1869.
O-album, Behr. Proc. Cal. Acad. Nat. Sci. 1863.
Hab.—California.
9. PROGNE, Cramer, pl. 5. Fabr. Gen. Ins. p. 264; Ent. Syst. III, p. 124. Godart, Enc. Meth. IX, p. 304. Bois. & Lec. p. 188, pl. 50. Harris, Ins. Mass. p. 301, 1862.
C-argenteum, Kirby, Faun. Bor. Am. IV, p. 294.
Hab.—Northern and Western States; Canada.

10. GRACILIS, Grote & Robinson, Ann. Lyc. Nat. Hist. N. Y. 1867.
Hab.—White Mountains.

11. ZEPHYRUS, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—California; Oregon; Rocky Mts.

12. SILENUS, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Oregon.

VANESSA, Fabricius.

1. ANTIOPA, Linn. Syst. Nat. 2. p. 776. Fabr. Syst. Ent. p. 503; Ent. Syst. III, p. 115. Esper. Eur. Schmett. pl. 12. Godart, Enc. Meth. IX, p. 308. Bois. & Lec. p. 173. Harris, Ins. Mass. p. 296, 1862.
Lintnerii (var.) Fitch, 5 vol. N. Y. Reports.
Hab.—United States, British America, Yukon River.

2. CALIFORNICA, Bois. Ann. Soc. Ent. de Fr. 1852.
Hab.—California; Oregon.

3. MILBERTII, Godart, Enc. Meth. IX, p. 307. Bois. & Lec. p. 187. pl. 50. Harris, Ins. Mass. p. 302, 1862.
Furcillata, Say, Am. Ent. II, pl. 27.
Hab.—Northern and Western States; California; British Am.

4. J-ALBUM, Bois. & Lec. p. 185, pl. 50. Harris, Ins. Mass. p. 298, 1862.
Hab.—Northern States; British Am.

PYRAMEIS, Hubner.

1. HUNTERA, Drury, Ins. I, pl. 5. Fabr. Syst. Ent. p. 499; Ent. Syst. III, p. 104. Abbot, Ins. Ga. pl. 9. Godart, Enc. Meth. IX, p. 324. Bois. & Lec. p. 180, pl. 48. Harris, Ins. Mass. p. 292, 1862.
Hab.—U. S., Atlantic to Pacific; Brit. Am.

2. CARDUI, Linn. Syst. Nat. 2, p. 274. Fabr. Syst. Ent. p. 499; Ent. Syst. III, p. 104. Godart, Enc. Meth. IX, p. 325. Bois. & Lec. p. 178. Harris, Ins. Mass. p. 291, 1862.
Hab.—U. S., Atlantic to Pacific; Brit. Am.

3. CARYE, Hubner, Samml. Exot. Schmett. 1806.
Hab.—California.

4. *ATALANTA*, Linn. Syst. Nat. 2, p. 779. Fabr. Syst. Ent. p. 504; Ent. Syst. III, p. 118. Godart, Enc. Meth. IX. p. 319. Bois. & Lec. p. 175. Harris, Ins. Mass. p. 294, 1862.

Hab.—U. S., Atlantic to Pacific; Brit. Am.

JUNONIA, Hubner.

- LAVINIA*, Cramer, pl. 21. Harris, Ins. Mass. p. 293, 1862.

Flirtea, Fabr. Ent. Syst. III, p. 90.

Orithya, Abbot, Ins. Ga. pl. 8.

Cœnia, Bois. & Lec. p. 182. pl. 49.

Hab.—Southern and Western States; occasional in N. Y.; California.

ANARTIA, Hubner.

- JATROPHÆ*, Linn. Syst. Nat. 2, p. 779. Cramer, pl. 202. Fab. Syst. Ent. p. 493; Ent. Syst. III, p. 98. Godart, Enc. Meth. IX. p. 297.

Hab.—Texas.

SMYRNA, Westwood.

- KARWINSKI*, Geyer in Hubner, Samml. Exot. Schmett. III. Doubleday, Gen. Diur. Lep. pl. 46, fig. 2.

Hab.—Texas; New Mexico.

VICTORINA, Blanchard.

- STELENES*, Linn. Syst. Nat. 2, 750. Cramer, pl. 79. Fabr. Syst. Ent. p. 456, Ent. Syst. III, p. 84. Lucas, Pap. Exot. pl. 79.

Lavinia, Fabr. Syst. Ent. p. 450; Ent. Syst. III, p. 22.

Hab.—New Mexico.

EUREMA, Hubner.

- LETHE*, Fabr. Ent. Syst. III, p. 80. Hubner, Samml. Exot. Schmett. II, pl. 26.

Hab.—Texas; New Mexico.

CYBDELIS, Doubleday.

- HYPERIPTE*, Hubner, Samml. Exot. Schmett. 1806.

Hab.—Florida.

TIMETES, Westwood.

1. *CORESIA*, Doubleday, Gen. Diur. Lep. II. Edwards, Proc. Ent. Soc. Phil. 1862.

Zerynthia, Hubner, Samml. Exot. Schmett. II.

Hab.—Texas; New Mexico.

2. *ELEUCHA*, Hubner. Samml. Exot. Schm. II. Doubleday, Gen. Diur. Lep. pl. 33.
Hab.—Florida (Apalachicola)
3. *PETREUS*, Cramer, pl. 87. Esper. Ausl. pl. 58.
Hab.—New Mexico.

CALLICORE, Hubner.

- CLYMENA*, Cramer, pl. 24. Fabr. Sp. Ins. p. 53; Ent. Syst. III, p. 43. Lucas, Pap. Exot. pl. 72.
Hab.—Florida.

LIMENITIS, Fabricius.

1. *ARTHEMIS*, Drury, Ins. ii, pl. 10. Say, Am. Ent. pl. 23. Bois. & Lec. p. 202, pl. 54. Harris, Ins. Mass. p. 283, pl. 1. 1862.
Lamina, Fabr. Ent. Syst. III, p. 118. Godart, Enc. Meth. IX. p. 580.
Hab.—Northern States; British Am.; Fort Simpson.
2. *WEIDEMEYERII*, Edwards, Proc. Acad. Nat. Sci. Phil. 1861; Butterflies of North America, pl. 2 of Limenitis.
Hab.—Colorado, Rocky Mts.
3. *PROSERPINA*, Edwards, Proc. Ent. Soc. Phil. 1865; Trans. Am. Ent. Soc. 1867. Butterflies of North America, pl. 1 of Limenitis.
Hab.—Catskill Mts.; White Mts.; Nova Scotia; Canada.
4. *URSULA*, Fabr. Ent. Syst. III, p. 82. Abbot, Ins. Geo. pl. 10. Godart, Enc. Meth. IX. p. 380. Bois. & Lec. p. 199, pl. 53.
Astyanax, Fabr. Syst. Ent. p. 447.
Ephestion, Stoll. Supp. pl. 25. Godart, Enc. Meth. IX. p. 42. Harris, Ins. Mass. p. 283, 1862.
Hab.—Atlantic and Southern States; Miss. Valley; Canada.
5. *LORQUINII*, Bois. Ann. Soc. Ent. de Fr. 1852. Edwards, Butterflies of North America, pl. 3 of Limenitis.
Hab.—California.
6. *MISIPPUS*, Fabr. Syst. Ent. p. 481; Ent. Syst. III. p. 50.
Dissipus, Godart, Enc. Meth. IX. p. 393. Bois. & Lec. p. 204, pl. 55.
Harris, Ins. Mass. p. 281, 1862.
Hab.—U. S., Atlantic to Pacific; Canada.

7. CALIFORNICA, Butler, Proc. Zool. Soc. Lond. 1865.

Eulalia, Bois. Ann. Soc. Ent. Fr. 1852. (not of Doubleday.)*Bredowii*, Edwards, Butterflies of North America, pl. 4 of *Limenitis*, (not of Hubner.)*Hab.*—California.

APATURA, Fabricius.

1. CELTIS, Bois. & Lec. p. 210, pl. 57.

Hab.—Virginia to Florida; Western States.

2. IDYIA, Hubner, Exot. Schmett.

Hab.—Texas; Indian Territory.

3. CLYTON, Bois. & Lec. p. 208, pl. 56.

Hab.—Southern and Western States; occasional in New York.4. ALICIA, Edwards, Butterflies of North America, pl. 1 of *Apatura*.*Hab.*—Southern States; Texas.

5. PROSERPINA, Scudder, Trans. Chicago Acad. Nat. Sci. 1869.

Hab.—Iowa.

MEGISTANIS, Westwood.

ACHERONTA, Fabr. Syst. Ent. p. 501. (1775); Ent. Syst. III, p. 76.

Cadmus, Cramer, pl. 22. (1779.)*Hab.*—Texas; New Mexico.

AGANISTHOS, Boisduval.

ORION, Fabr. Syst. Ent. p. 485; Ent. Syst. III, p. 55. Godart, Enc. Meth. IX. p. 368. Bois. & Lec. p. 195, pl. 52.

Odius, Fabr. Syst. Ent. p. 457.*Danae*, Cramer, pl. 84.*Hab.*—Florida.

PAPHIA, Westwood.

GLYCERIUM, Doubleday, Gen. Diur. Lep. pl. 50. Riley, Am. Entomologist, Feb. 1870. Edwards, Butterflies of North America, plate.

Hab.—Illinois to Kansas; Texas.

LIBYTHEIDÆ.

LIBYTHEA, Fabricius.

1. CARINENTA, Cramer, II, pl. 108. Fab. Sp. Ins. p. 104; Ent. Syst. III, p. 139.
Hab.—New Mexico; Arizona.
2. MOTYA, Boisduval & Leconte, pl. 64.
Hab.—Southern States.
3. BACHMANNII, Kirtland, Silliman's Journal, XIII, new series, p. 336.
Hab.—Middle and Western States.

SATYRIDÆ.

EUPTYCHIA, Hubner.

1. EURYTUS, Fab. Syst. Ent. p. 487.
Eurytris, Fab. Ent. Syst. III, p. 157. Harris, Ins. Mass. p. 306, 1862.
Eurythris, Godart, Enc. Meth. IX, pp. 465, 495. Bois. & Lec. pl. 61.
Cymela, Cramer, pl. 132.
Cymelia, Hubner, Verz. Bek. Schmett. p. 54.
Hab.—Atlantic, Southern and Western States; Canada.
2. SOSYBIUS, Fab. Ent. Syst. III, p. 219. Godart, Enc. Meth. IX, pp. 465, 495. Bois. & Lec. pl. 63.
Hab.—Middle, Southern and Western States.
3. RUBRICATA, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Waco, Texas.
4. AREOLATA, Abbot, Ins. Ga. pl. 13. Godart, Enc. Meth. IX, pp. 464, 494.
Bois. & Lec. pl. 63.
Hab.—Southern States; Morristown, N. J. (Julius Meyer.)
5. GEMMA, Hubner, Samml. Exot. Schmett. pl. 7. Bois. & Lec. pl. 62.
Hab.—West Va.; Southern States.

CENONYMPHA, Hubner.

1. PAMPHILOIDES, Reakirt, Proc. Ent. Soc. Phil. 1866.
Hab.—Colorado.
2. INORNATA, Edwards, Proc. Acad. Nat. Sci. Phil. 1861.
Hab.—Lake Winnipeg; West Coast; Vancouver's Island.

3. CALIFORNICA, Westwood & Hewitson, Gen. Diur. Lep. p. 398, pl. 67. Boisduval, Ann. Soc. Ent. Fr. 1862.

Var. *Ceres*, Butler, Ent. Month. Mag. 1866.

Hab.—California.

4. OCHRACEA, Edwards, Proc. Acad. Nat. Sci. Phil. 1861.

Hab.—Lake Winnipeg; California; Kansas.

5. AMPELOS, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Oregon.

6. GALACTINA, Boisduval, Ann. Soc. Ent. Fr. 1852.

Hab.—California.

7. KODIAK, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—Kodiak.

8. BRENDA, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—Los Angeles, California.

SATYRUS, Westwood.

1. PEGALA, Fabricius, Syst. Ent. p. 494; Ent. Syst. III, p. 230. Godart, Enc. Meth. IX, p. 524. Westwood, Gen. Diur. Lep. p. 392. Edwards, Proc. Ent. Soc. Phil. 1866.

Hab.—Gulf States.

2. ALOPE, Fabricius, Ent. Syst. III, p. 229. Godart, Enc. Meth. IX, p. 524.

Bois. & Lec. p. 228, pl. 59. Harris, Ins. Mass. p. 305, 1862.

Hab.—Atlantic and Western States; Texas; Canada.

3. NEPHELE, Kirby, Fauna Bor. Am. p. 297. Harris, Ins. Mass. p. 306, 1862.

Edwards, Proc. Ent. Soc. Phil. 1866.

Hab.—Northern, Middle and Western States; Canada.

4. BOÖPIS, Behr, Proc. Cal. Acad. Nat. Sci. 1864. Edwards, Proc. Ent. Soc. Phil. 1866.

Hab.—California.

5. GABBII, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—Oregon.

6. ARIANE, Boisduval, Ann. Soc. Ent. Fr. 1852.

Hab.—California; Nevada.

7. SILVESTRIS, Edwards, Proc. Acad. Nat. Sci. Phil. 1861.

Ætus, Bois. Lep. de la Cal. 1869.

Hab.—California : Nevada.

8. STHENELE, Boisduval, Ann. Soc. Ent. Fr. 1852.

Hab.—California.

9. RIDINGSII, Edwards, Proc. Ent. Soc. Phil. 1865.

Hab.—Colorado.

EREBIA, Dalman.

1. EPIPSODEA, Butler, Cat. Satyridæ, Br. Museum, p. 80, pl. 2. 1868.

Hab.—Rocky Mountains.

2. VESAGUS, Hewitson & Westwood, Gen. Diur. Lep. pl. 64.

Hab.—Rocky Mountains.

3. MANCINUS, Hewitson & Westwood, Gen. Diur. Lep. pl. 64.

Hab.—Rocky Mountains; Aliaska.

4. ROSSII, Curtis, Appendix, Ross' Arctic Explorations, Nat. Hist. p. 57, pl. A.

Hab.—Boreal America.

5. FASCIATA, Butler, Cat. Satyridæ, Br. Museum, p. 92, pl. 2, 1868.

Hab.—Boreal America.

6. DISCOIDALIS, Kirby, Fauna Bor. Am. p. 298, pl. 3.

Hab.—Boreal America ; Fort Simpson ; Aliaska.

LETHE, Hubner.

- PORTLANDIA, Fabricius, Ent. Syst. III, p. 103. Bois. & Lec. p. 226, pl. 58.

Andromacha, Hubner, Samml. Exot. Schmett. pl. 89. Say, Am. Ent. III, pl. 36.

Hab.—West Virginia to Missouri ; Southern States.

PARARGE, Hubner.

- BOISDUVALLII, Harris, Ins. Mass. p. 305, 1862.

Canthus, Bois. & Lec. pl. 60. (not of Linn. and Fab.)

Hab.—New Jersey to Canada ; Illinois.

CHIONOBAS, Boisduval.

1. JUTTA, Hubner, Europ. Schmett. pl: 120. Bois. Icones, pl. 38. Möschler, Wien. Ent. Monat. IV, p. 342; VII, p. 201. Scudder, Proc. Ent. Soc. Phil. 1865.
Balder, Hubner, Zutrage, p. 43. Bois. Icones. pl. 39. Bois. & Lec. p. 216.
Hab.—Boreal America; Hudson's Bay; Labrador; Quebec.
2. CHRYXUS, Hewitson, Gen. Diur. Lep. pl. 64. Edwards, Proc. Ent. Soc. Phil. 1863. Scudder, Proc. Ent. Soc. Phil. 1865.
Hab.—Rocky Mountains.
3. NEVADENSIS, Felder. Reise der Fr. Novara, III. pl. 62. Scudder, Proc. Ent. Soc. Phil. 1865.
Hab.—California; Nevada.
4. GIGAS, Butler, Cat. Satyridæ, Br. Museum, p. 161, pl. 2, 1868.
Hab.—Vancouver's Island.
5. SEMIDEA, Say, Am. Ent. III. pl. 50. Harris, Ins. Mass. p. 304, 1862. Scudder, Proc. Bost. Soc. Nat. Hist. 1863; Proc. Ent. Soc. Phil. 1865.
Also, Bois. & Lec. p. 222.
Hab.—White Mountains, New Hampshire.
6. OENO, Boisduval, Icones, p. 195, pl. 39. Bois. & Lec. p. 220. Möschler, Wien. Ent. Monat. IV. p. 342; VII. p. 211. Scudder, Proc. Ent. Soc. Phil. 1865.
Also, Boisduval, Icones, p. 197, pl. 40. Möschler, Wien. Ent. Monat. VII, p. 205.
Crambis, Freyer, Neu Beitrage, V, p. 99, pl. 440. Westwood, Gen. Diur. Lep. p. 383.
Hab.—Boreal America; Labrador.
7. ASSIMILIS, Butler, Cat. Satyridæ, Br. Museum, p. 163, pl. 2, 1868.
Hab.—Boreal America; Repulse Bay.
8. UHLERII, Reakirt, Proc. Ent. Soc. Phil. 1866.
Hab.—Colorado.

9. SUBHYALINA, Curtis, Appendix Ross' Arctic Explorations, p. 68.
Hab.—Boreal America.
10. CALAIS, Scudder, ♀, Proc. Ent. Soc. Phil. 1865.
♀ *Taygete*, Edwards, Proc. Acad. Nat. Sci. Phil. 1862. ♀ (not ♂), Hubner, Samml. Exot. Schmett.
Hab.—Rupert House, Hudson's Bay.
11. BORE, Esper, Europ. Schmett. pl. 100. Bois. Icones, p. 193, pl. 37. Scudder, Proc. Ent. Soc. Phil. 1865.
Bootes, Hubner, Europ. Schmett. I, figs. 1025—1028. Bois. Icones, p. 191, pl. 37. Möschler, Wien. Ent. Monat. IV. p. 342.
Taygete, Hubner, Samml. Exot. Schmett. Möschler, Wien. Ent. Monat. IV, p. 342; VII. p. 213.
Hab.—Labrador.
12. STRETCHII, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Nevada.

LYCÆNIDÆ.

THECLA, Fabricius.

1. HALESUS, Cramer, pl. 98. Fab. Sp. Ins. p. 116; Ent. Syst. III, p. 273. Godart, Enc. Meth. IX, p. 626. Bois. & Lec. p. 83, pl. 25.
Dolichos, Hubner, Zuträg. p. 219.
Juanita, Scudder. Proc. Bost. Soc. Nat. Hist. 1868.
Hab.—Florida to Texas; California.
2. M-ALBUM, Boisduval. Bois. & Lec. p. 86, pl. 26.
Var. *Psyche*, Bois. & Lec. p. 88, pl. 27.
Hab.—Southern States; occasional in Virginia and Pennsylvania.
3. SPINETORUM, Boisduval in Hewitson's Illus. Lyc. III, fig. 198, 199; Lep. de la Cal. 1869.
Hab.—California.
4. FAVONIUS, Abbot, Ins. Ga. pl. 14. Godart, Enc. Meth. IX, p. 635.
Liparops, Bois. & Lec. p. 99, pl. 31.
Hab.—Southern States.

5. HUMULI, Harris, Ins. Mass. p. 276, 1862.
 Melinus, Hubner, Zuträg. fig. 121, 122.
 Favonius, Bois. & Lec. p. 95, pl. 30.
 Hyperici, Bois. & Lec. p. 90, pl. 28.
 Hab.—Southern and Western States.
6. CALIFORNICA, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
 Borus, Bois. Lep. de la Cal. 1869.
 Hab.—California.
7. ACADICA, Edwards, Proc. Acad. Nat. Sci. Phil. 1862; Butterflies of North America, pl. I of Thecla.
 Var. *Sowhegan*, Whitney.
 Hab.—New England; New York; Canada.
8. CYGNUS, Edwards, Trans. Am. Ent. Soc. 1871.
 Hab.—Nevada.
9. EDWARDSII, Saunders, MSS.—See Can. Entom. I, p. 98, 99. Scudder, Proc. Bost. Soc. Nat. Hist. p. 274, 1870.
 Falacer, Harris, Ins. Mass. p. 276, 1862. Scudder, Proc. Bost. Soc. Nat. Hist. p. 378, 1868; Trans. Chicago Acad. Nat. Sci. I, p. 331.
 Calanus, Grote & Robinson, Trans. Am. Ent. Soc. I, pp. 172, 324.
 Hab.—Northern and Western States; Canada.
10. CALANUS, Hubner, Samml. exot. Schmett. Westwood & Hewitson, Gen. Diur. Lep. II, 486. Scudder, Proc. Bost. Soc. Nat. Hist. p. 275, 1870.
 Falacer, Godart, Enc. Meth. IX, pp. 600, 633. Bois. & Lec. p. 92, pl. 29. Scudder, Proc. Bost. Soc. Nat. Hist. p. 378, 1868; Trans. Chicago Acad. Nat. Sci. I, 331. Grote & Robinson, Trans. Am. Ent. Soc. I. p. 172.
 Hab.—Atlantic and Western States; Canada.
11. LORATA, Grote & Robinson, Trans. Am. Ent. Soc. I, p. 171, 1867.
 Hab.—Virginia.
12. ONTARIO, Edwards, Trans. Am. Ent. Soc. 1868; Butterflies of North America, pl. 2 of Thecla.
 Hab.—Canada.

13. *STRIGOSA*, Harris, Ins. Mass. p. 276, 1862. Edwards, Butterflies of North America, pl. 2 of *Thecla*.
Hab.—New England; New York; West Virginia.
14. *SYLVINUS*, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
15. *SMILACTIS*, Boisduval. Bois. & Lec. p. 107, pl. 33.
Hab.—Middle and Western States.
16. *AUBURNIANA*, Harris, Ins. Mass. p. 277, 1862.
Hab.—Massachusetts.
17. *CASTALIS*, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Texas.
18. *SÆPIUM*, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
19. *AURETORUM*, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
20. *CHALCIS*, Behr, MSS. Edwards in Trans. Am. Ent. Soc. 1869.
Hab.—California.
21. *TETRA*, Behr, MSS. Edwards in Trans. Am. Ent. Soc. 1870.
Hab.—California.
22. *DRYOPE*, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—California.
23. *GRUNUS*, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
24. *MOPSUS*, Hubner, Zuträg. fig. 135, 136. Bois. & Lec. p. 109, p. 34. Harris, Ins. Mass. p. 278, 1862.
Hab.—New England to Missouri; Colorado; Canada.
25. *POEAS*, Hubner, Samml. Exot. Schmett. Bois. & Lec. p. 111. pl. 35.
Beon, Godart, Enc. Meth. IX, p. 636.
Hab.—Southern States; West Virginia.

26. *IRUS*, Godart, Enc. Meth. IX, p. 674. Bois & Lec. p. 101, pl. 31.
Hab.—Middle and Southern States.
27. *ARSACE*, Boisduval. Bois. & Lec. p. 103, pl. 32.
Var. *Henrici*, Grote & Robinson.
Hab.—Middle and Southern States.
28. *IROIDES*, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
29. *NIPHON*, Hubner, Zutrag. fig. 203, 204. Bois. & Lec. p. 105, pl. 33.
Hab.—Northern and Middle States; Colorado; Canada.
30. *EBYPHON*, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
31. *AUGUSTUS*, Kirby, Fauna Bor. Amer. IV, pl. 3. Harris, Ins. Mass. p. 279, 1862.
Hab.—New England; New York; Canada.
32. *BEHRII*, Edwards, Trans. Am. Ent. Soc. 1870.
Hab. California.
33. *NELSONI*, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
34. *DUMETORUM*, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Viridis, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—California.
35. *AFFINIS*, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—Utah.
36. *LÆTA*, Edwards, Proc. Acad. Nat. Sci. 1862; Butterflies of North America, pl. 1 of Thecla.
♀ *Clothilde*, Edwards, Proc. Ent. Soc. Phil. 1863.
Hab.—Canada; Maine; Catskill Mts., N. York; Kanawha, West Virginia.

FENISECA, Grote.

TARQUINIUS, Fabricius, Ent. Syst. III, p. 319. Godart, Enc. Meth. IX, p. 580.
Bois. & Lec. p. 128, pl. 37.

Var. *Porsenna*, Scudder, Proc. Essex. Ins. 1863.

Hab.—Atlantic and Western States.

CHRYSOPHANUS, Hubner.

1. AMERICANA, D'Urban, Can. Nat. V. p. 246. Harris, Ins. Mass. p. 273,
1862.

Phleas, Bois. & Lec. p. 123.

Hypophleas, Bois. Ann. Ent. Soc. de Fr. 1852.

Hab.—Northern States; Canada; California.

2. EPIXANTHE, Boisduval. Bois. & Lec. p. 127, pl. 38. Harris, Ins. Mass. p.
274, 1862.

Hab.—New England; Minnesota; Canada.

3. DORCAS, Kirby, Fauna Bor. Amer. IV, pl. 2.

Hab.—British America.

4. VIRGINIENSIS, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—Nevada.

5. AROTA, Boisduval, Ann. Ent. Soc. de Fr. 1852.

Hab.—California.

6. NAIS, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—California; Nevada.

7. HELLOIDES, Boisduval, Ann. Ent. Soc. de Fr. 1852.

Hab.—California.

8. IANTHE, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Virginia City, Nevada.

9. MARIPOSA, Reakirt, Proc. Ent. Soc. Phil. 1867.

Nivalis, Bois. Lep. de la Cal. 1869.

Hab.—California.

10. CASTRO, Reakirt, Proc. Ent. Soc. Phil. 1867.

Zerore, Bois. Lep. de la Cal. 1869.

Hab.—Colorado; Utah.

11. HERMES, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—California; Nevada.
 12. HYLLUS, Cramer, pl. 44. Fab. Sp. Ins. p. 106; Ent. Syst. III, p. 253.
Thoe, Bois. in Guerin. Reg. Anim. de Cuv. pl. 81. Bois. & Lec. p. 125,
pl. 38.
Hab.—Northern States; Iowa; Wisconsin; Canada.
 13. DIONE, Scudder, Proc. Bost. Soc. Nat. Hist. 1868; Trans. Chicago Acad.
Nat. Sci. 1868.
Hab.—Iowa; Missouri.
 14. XANTHOIDES, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
 15. GORGON, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
 16. RUBIDUS, Behr, Proc. Ent. Soc. Phil. 1866.
Hab.—Oregon.
 17. CUPREUS, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Oregon.
- LYCÆNA, Fabricius.
1. HETERONEA, Boisduval, Ann. Ent. Soc. de Fr. 1852.
Hab.—California.
 2. RUFESCENS, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
 3. NESTOS, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
 4. CILLA, Behr, Proc. Cal. Acad. Nat. Sci. 1867.
Hab.—California.
 5. AEHAJA, Behr, Proc. Cal. Acad. Nat. Sci. 1867.
Hab.—California.
 6. FULIGINOSA, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Suasa, Bois. Lep. de la Cal. 1869
Hab.—California.

7. *RHEA*, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
8. *BATTOIDES*, Boisduval, Lep. de la Cal., 1869.
Hab.—California.
9. *GLAUCON*, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Nevada.
10. *ACMON*, Hewitson & Westwood, Gen. Diur. Lep. pl. 76.
Antægon, Bois. Ann. Ent. Soc. Fr. 1852.
Hab.—California; Colorado.
11. *SCUDDERII*, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—Canada; New York.
12. *LUPINI*, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
13. *CALCHAS*, Behr, Proc. Cal. Acad. Nat. Sci. 1867.
Nivium, Bois. Lep. de la Cal. 1869.
Hab.—California.
14. *ANNA*, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Oajona, Reakirt, Proc. Ent. Soc. Phil. 1867.
Argyrotoxus, Behr, Proc. Cal. Acad. Nat. Sci. 1867.
Philemon, Bois. Lep. de la Cal. 1869.
Hab.—California; Nevada; Colorado.
15. *REGIA*, Boisduval, Lep. de la Cal. 1869.
Hab.—Mt. Diablo, California; San Diego.
16. *COMYNTAS*, Godart, Enc. Meth. IX, p. 660. Bois. & Lec. p. 120, pl. 36.
Harris, Ins. Mass. p. 275, 1862.
Hab.—Atlantic, Western and Southern States; Canada.
17. *AMYNTULA*, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California.
- 18. *MONILA*, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—California.

19. TEJUA, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—California.
20. CATALINA, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—California.
21. SHASTA, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—California.
22. EXILIS, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California; Arizona.
23. ISOLA, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—Waco, Texas.
24. GYAS, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Arizona.
25. FILENUS, Poey, Cent. de l'isle de Cuba. Bois. & Lec. p. 114, pl. 35.
Hab.—Southern States.
26. AQUILO, Boisduval, Icones, pl. 12. Möschler, Wien. Ent. Monat. IV, p. 343.
Franklinii, Curtis, Appendix Ross' Arctic Explorations, p. 69.
Hab.—Boreal America; Labrador.
27. ENOPTES, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California.
28. PARDALIS, Behr, Proc. Cal. Acad. Nat. Sci. 1867.
Hab.—California.
29. FULLA, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—California.
30. VIACA, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Sierra Nevada, California.
31. MINTHA, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—California.
32. XERXES, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California.

33. EYTUS, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
34. TEHAMA, Reakirt, Proc. Acad. Nat. Sci. 1866.
Hab.—Southern California.
35. RUSTICA, ♀, Edwards, Proc. Ent. Soc. Phil. 1864.
Hab.—Colorado.
36. PHERES, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California.
37. LORQUINI, Behr, Proc. Cal. Acad. Nat. Sci. 1867.
Hab.—California.
38. MARICOPA, Reakirt, Proc. Acad. Nat. Sci. Phil. 1866.
Hab.—California.
39. ERYMUS, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
40. RAPAHOE, Reakirt, Proc. Ent. Soc. Phil. 1867.
Hab.—Colorado.
41. SÆPIOLUS, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California.
42. DÆDALUS, Behr, Proc. Cal. Acad. Nat. Sci. 1867.
Hab.—California.
43. PHILEROS, Boisduval, Lep. de la Cal. 1869.
Hab.—California.
44. ICAROIDES, Boisduval, Ann. Ent. Soc. Fr. 1852.
Hab.—California.
45. AMICA, Edwards, Proc. Ent. Soc. Phil. 1863.
Hab.—Fort Ross, Mackenzies River.
46. MERTILA, Edwards, Proc. Ent. Soc. Phil. 1866.
Hab.—California.

47. *ARDEA*, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Nevada.
48. *ORCUS*, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—California.
49. *HELIOS*, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—California.
50. *BEHRII*, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Polyphemus, Bois. Lep. de la Cal. 1869.
Hab.—California.
51. *ANTIACIS*, Boisduval, Ann. Ent. Soc. Fr. 1862.
Hab.—California.
52. *LYGDAMAS*, Doubleday, The Entomologist, 1841. Edwards, Butterflies of North America, pl. 1 of *Lycæna*.
Hab.—Michigan to Georgia; Colorado.
53. *PEMBINA*, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—New York; Canada; British America.
54. *KODIAK*, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Kodiak.
55. *LYCEA*, Edwards, Proc. Ent. Soc. Phil. 1864.
Hab.—Colorado.
56. *VIOLACEA*, Edwards, Proc. Ent. Soc. Phil. 1866; Butterflies of North America, pl. 1 of *Lycæna*.
Hab.—Virginia to Minnesota; Canada.
57. *LUCIA*, Kirby, Fauna Bor. Am. p. 299, pl. 3.
Pseudargiolus, Harris, Ins. Mass. figs. 105, 106. (not text) 1862.
Hab.—New England; New York; Canada.
58. *PIASUS*, Boisduval, Ann. Ent. Soc. Fr. 1852.
Echo, Edwards, Proc. Ent. Soc. Phil. 1864.
Hab.—California.

59. *NEGLECTA*, Edwards, Proc. Acad. Nat. Sci. Phil. 1862; Butterflies of North America, pl. 2 of *Lycæna*.
Pseudargiolus, Harris, Ins. Mass. p. 274, text (not plate), 1852.
Hab.—New England; Middle States; Minnesota; Colorado; Canada.
60. *PSEUDARGIOLUS*, Bois. & Lec. p. 118, text (not plate). Edwards, Proc. Ent. Soc. Phil. 1866; Butterflies of North America, pl. 2 of *Lycæna*.
Argiolus, Abbot. Ins. Ga. pl. 15.
Hab.—Virginia; Pennsylvania; Southern States.

ERYCINIDÆ,

LEMONIAS, Westwood.

1. *MORMO*, Felder, Wien. Ent. Monat. III, p. 271.
Dumeti, Behr, Proc. Cal. Acad. Nat. Sci. 1865.
Hab.—California; Arizona; New Mexico.
2. *VERGULTI*, Behr, Proc. Cal. Acad. Nat. Sci. 1865.
Hab.—Southern California.
3. *PALMERII*, Edwards, Trans. Am. Ent. Soc. 1870.
Hab.—Utah.

CHARIS, Hubner.

1. *CÆNIUS*, Linn. Syst. Nat. II, p. 196.
Pumila, Bois. & Lec. p. 131, pl. 37.
Hab.—Southern States; Texas.
2. *BOREALIS*, Grote & Robinson, Ann. New York Lyc. Nat. Hist. 1866
Hab.—New York; Michigan; West Virginia.

EUMÆUS, Hubner.

1. *ATALA*, Poey, Cent. Lep. Guerin, Icon. Regne Anim. Ins. text, p. 489.
Doubleday & Hewitson, Gen. Diur. Lep. pl. 74.
Toxea, Gray, Griffith's Anim. King. XV, pl. 43. Guerin, Icon. Regne Anim. Ins. pl. 80.
Hab.—Florida.
2. *MINYAS*, Hubner, Samml. Exot. Schmett. Bois. Spec. Gen. pl. 21.
Toxea, Godart, Enc. Meth. IX, p. 826. Lucas, Lep. Exot. pl. 79.
Hab.—Texas; New Mexico.

HESPERIDÆ.

ERYCIDES, Hubner.

1. URANIA, Westwood & Hewitson, Gen. Diur. Lep. pl. 79.
Hab.—Texas.
2. TEXANA, Scudder, Report Peabody Acad. Sci. 1871.
Hab.—Texas.
3. SANGUINEA, Scudder, Report Peabody Acad. Sci. 1871.
Hab.—Texas.

THYMELE, Fabricius.

1. PROTEUS, Linnæus, Syst. Nat. II, p. 794. Fab. Syst. Ent. p. 532. Cramer,
pl. 260. Abbot, Ins. Ga. pl. 18. Bois. & Lec. pl. 69.
Hab.—Gulf States.
2. SIMPLICIUS, Stoll, Suppt. Cramer, pl. 39.
Hab.—New Mexico; Texas.

EPARGYREUS, Hubner.

1. TITYRUS, Fabricius, Syst. Ent. p. 532. Abbot, Ins. Ga. pl. 19. Bois. & Lec.
pl. 72. Harris, Ins. Mass. p. 310, pl. V, 1862.
Clarus, Cramer, pl. 41.
Hab.—Atlantic, Gulf and Western States; Canada.
2. HESUS, Westwood & Hewitson, Gen. Diur. Lep. pl. 78.
Hab.—Texas.

ACHALARUS, Scudder.

- LYCIDAS, Abbot, Ins. Ga. pl. 20. Bois. & Lec. pl. 71.
Lyciades, Hubner, Zuträg. fig. 621, 622.
Hab.—Southern and Western States; New York.

ACOLASTUS, Scudder.

- SAVIGNYI, Godart, according to Scudder, Report Peabody Acad. Sci. 1871.
Hab.—Key West, Florida.

SPATHILEPIA, Butler.

- CELLUS, Boisduval, Bois. & Lec. pl. 73.
Hab.—Southern States; West Virginia.

THORYBES, Scudder.

1. BATHYLLUS, Abbot, Ins. Ga. pl. 22. Bois. & Lec. pl. 74.
Hab.—Southern States.
2. PYLADES, Scudder, Proc. Bost. Soc. Nat. Hist. 1870.
Bathyllus, Harris, Ins. Mass. p. 312, 1862.
Hab.—Northern and Middle States.
3. NEVADA, Scudder, Report Peabody Acad. Sci. 1871.
Hab.—Nevada.

ACHYLODES, Hubner.

- THRASO, Hubner, Samml. Exot. Schmett.
Eantis, Bois. Sp. Gen. 1, pl. 13.
Tamenund, Edw. Trans. Am. Ent. Soc. 1871.
Hab.—Texas.

NISONIADES, Hubner.

1. JUVENALIS, Fabricius, Ent. Syst. III, p. 339. Abbot, Ins. Ga. pl. 21. Bois. & Lec. pl. 65. Harris, Ins. Mass. p. 309, 1862.
Costalis, Westwood, Gen. Diur. Lep. pl. 79.
Hab.—Southern and Middle States.
2. PERSIUS, Scudder, Proc. Essex Ins. 1862, p. 170.
Hab.—Northern and Middle States.
3. MARTIALIS, Scudder, Trans. Chicago Acad. Nat. Sci. 1869, p. 335.
Hab.—Iowa.
4. ICELUS, Lintner, 23rd Rep. N. Y. St. illus. Nat. Hist. 1872, p. 162, pl. 7.
Hab.—New York.
5. LUCILIUS, Lintner, 23rd Rep. N. Y. St. illus. Nat. Hist. 1872, p. 164, pl. 7.
Hab.—New York.
6. AUSONFUS, Lintner, 23rd Rep. N. Y. St. illus. Nat. Hist. 1872, p. 166, pl. 7.
Hab.—New York.
7. BRIZO, Boisduval, Bois. & Lec. pl. 66. Harris, Ins. Mass. 1862, p. 309.
Hab.—Northern and Middle States.
8. TRISTIS, Boisduval. Ann. Soc. Ent. de Fr. 1852.
Hab.—California.

9. ? *TAGES*, var. *CERVANTES*, Graslin, Ann. Soc. Ent. de Fr. 1852. Bois. *ibid*, 1852.

Hab.—California.

PHOLISORA, Scudder.

1. *CATULLUS*, Cramer, pl. 260. Fab. Ent. Syst. III, p. 348. Abbot, Ins. Ga. pl. 24.

Hab.—Atlantic, Southern and Western States.

2. *HAYHURSTII*, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—Missouri; West Virginia.

LEUCOSCIRTES, Scudder.

1. *ERICETORUM*, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Alba, Edw. Proc. Ent. Soc. Phil. 1866.

Hab.—California; Oregon.

2. *OCEANUS*, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Arizona.

HESPERIA, Fabricius.

1. *TESSELLATA*, Scudder, Report Peabody Acad. Sci. 1871.

Oileus, Westw. & Humph. Brit. But. pl. 38. (not Linn.)

Hab.—Middle, Southern and Western States; Colorado.

2. *CENTAUREÆ*, Rambur, Faun. And. pl. 8, 1839. Herr. Schæff. Schmett. Eur. I, 1839. Möschler, Wien. Ent. Monat. VIII, p. 193.

Wyandot, Edw. Proc. Ent. Soc. Phil. 1863.

Hab.—Labrador to Virginia.

3. *RURALIS*, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Ricara, Edw. Proc. Ent. Soc. Phil. 1864, pl. 1.

Hab.—California; Colorado.

4. *CÆSPITALIS*, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

5. *SCRIPTURA*, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

6. *PETREIUS*, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Nevada.

ANCYLOXYPHA, Felder.

NUMITOR, Fabricius, Ent. Syst. III, p. 324.

Puer, Hubner, Zuträg. f. 275, 276.

Marginatus, Harris, Ins. Mass. 2nd Ed. p. 308, 1862.

Hab.—Atlantic and Western States.

OARISMA, Scudder.

POWESHEIK, Parker, Am. Ent. II, p. 271, 1870.

Hab.—Iowa; Illinois.

THYMELICUS, Hubner.

1. WACO, Edwards, Trans. Am. Ent. Soc. 1867.

Var. *Minima*, Edw. *ibid*, 1870.

Hab.—Texas.

2. PROCRIS, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Texas.

3. ARENE, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Arizona.

4. GARITA, Reakirt, Proc. Ent. Soc. Phil. 1867.

Hylax, Edw. Trans. Am. Ent. Soc. 1871.

Hab.—Colorado.

5. RURICOLA, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

POTANTHUS, Scudder.

1. OMAHA, Edwards, Proc. Ent. Soc. Phil. 1863.

Mingo, Edw. *ibid*, 1865.

Hab.—Colorado.

2. CALIFORNICA, Scudder, Report Peabody Acad. Sci. 1871.

Hab.—California.

CYCLOPIDES, Hubner.

1. MANDAN, Edwards, Proc. Ent. Soc. Phil. 1862, pl. 5.

? *Mesapano* Scud. Proc. Bost. Soc. Nat. Hist. 1868.

Hab.—Great Slave Lake; Maine.

2. SKADA, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Alaska.

AMBLYSCHIRTES, Scudder.

1. VIALIS, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—Middle and Western States.
2. EOS, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Texas.
3. SAMOSET, Scudder, Proc. Essex Ins. p. 78, 1862.
Hegon, Scudder, *ibid*, p. 77.
Nemoris, Edw. Proc. Ent. Soc. Phil. 1863.
Alternata, G. & R. Trans. Am. Ent. Soc. 1867.
Hab.—Northern and Middle States.
4. KIOWAH, Reakirt, Proc. Ent. Soc. Phil. 1867.
Hab.—Colorado.
5. HORUS, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Texas.

STOMYLES, Scudder.

- TEXTOR, Hubner, *Zutrag*. f. 515, 516.
Onoko, Scud. Proc. Essex Ins. 1862.
Wakulla, Edw. Trans. Am. Ent. Soc. 1869.
Hab.—Gulf States.

OCYTES, Scudder.

1. RIDINGSII, Reakirt, Proc. Ent. Soc. Phil. 1867.
Hab.—Colorado.
2. METEA, Scudder, Proc. Essex Ins. 1862.
Hab.—Connecticut; Colorado.
3. DRACO, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Colorado; Utah; California.
4. SEMINOLE, Scudder, Report Peabody Acad. Sci. 1871.
Hab.—Florida.

POANES, Scudder.

- MASSASOIT, Scudder, Proc. Essex Ins. 1862.
Hab.—New England; New York.

PHYCANASSA, Scudder.

- VIATOR, Edwards, Proc. Ent. Soc. Phil. 1864. pl. 1.
Hab.—Gulf States; Illinois.

ATRYTONE, Scudder.

1. IOWA, Scudder, Trans. Chicago Acad. Nat. Sci. 1869.
Vitellius, Abbot, Ins. Ga. pl. 17. (not Fab.)
Hab.—Florida; Iowa.
2. DELAWARE, Edwards, Proc. Ent. Soc. Phil. 1863, pl. 5.
 ♀, *Logan*, Edw. *ibid*, pl. 1.
Hab.—West Virginia; Delaware; Pennsylvania.
3. CONSPICUA, Edwards, ♀, Proc. Ent. Soc. Phil. 1863. Scud. ♂, Proc. Chicago Acad. Nat. Sci. 1868. Parker, Can. Ent. 1871.
Hab.—Michigan; Wisconsin; Iowa.
4. ZABULON, Boisduval. Bois. & Lec. pl. 76.
Hab.—West Virginia; Southern States.
5. HOBOMOK, Harris, Ins. Mass. 2nd Ed. p. 313, 1862.
Quadaquina, Scud. Proc. Bost. Soc. Nat. Hist. 1868.
Pocahontas, var. ♀, *ibid*, Proc. Essex Ins. 1862.
Hab.—New England; Middle States; Canada.

EUTHYMUS, Scudder.

- PHYLÆUS, Drury, 1, pl. 13. Bois. & Lec. pl. 78.
Vitellius, Fab. Ent. Syst. III, p. 327.
Hab.—Middle, Southern and Western States.

PAMPHILA, Fabricius.

1. JUBA, Scudder, Report Peabody Acad. Sci. 1871.
Comma, Bois. Ann. Soc. Ent. de Fr. 1852. (not Linn.)
Hab.—California; Colorado.
2. COLUMBIA, Scudder, Report Peabody Acad. Sci. 1871.
Hab.—California.
3. SASSACUS, Scudder, Proc. Essex Ins. 1862.
Hab.—New England.
4. NAPA, Edwards, Proc. Ent. Soc. Phil. 1864, pl. 1.
Dacotah, Edw. Trans. Am. Ent. Soc. 1871.
Hab.—Colorado.
5. MELANE, Edwards, Trans. Am. Ent. Soc. 1869.
Hab.—California.

6. OTTOE, Edwards, Proc. Ent. Soc. Phil. 1866.

Hab.—Kansas; Indian Territory.

ATALOPEDES, Scudder.

1. HURON, Edwards, Proc. Ent. Soc. Phil. 1863, pl. 1.

Hab.—West Virginia; Louisiana; Texas.

2. CAMPESTRIS, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

ANTHOMASTER, Scudder.

1. LEONARDUS, Harris, Ins. Mass. 2nd Ed. p. 314, 1862.

Hab.—New England to West Virginia.

2. UNCAS, Edwards, Proc. Ent. Soc. Phil. 1863, pl. 5.

Hab.—Pennsylvania; Ohio.

POLITES, Scudder.

1. PECKIUS, Kirby, Faun. Bor. Amer. IV, p. 300, pl. 4.

Wamsutta, Harris, Ins. Mass. 2nd Ed. p. 318, 1862.

Hab.—Northern and Middle States; Canada.

2. SABULETI, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

OCHLODES, Scudder.

1. NEMORUM, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Yreka, Edw. Proc. Ent. Soc. Phil. 1866.

Hab.—California.

2. AGRICOLA, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

3. SONORA, Scudder, Report Peabody Acad. Sci. 1871.

Hab.—Sierra Nevada, California.

AUGIADES, Hubner.

- ? 1. SYLVANOIDES, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

- ? 2. PRATINCOLA, Boisduval, Ann. Soc. Ent. de Fr. 1852.

Hab.—California.

HEDONE, Scudder.

1. BRETTUS, Boisduval, ♀, Bois. & Lec. pl. 75.
Wingina, ♂, Scud. Proc. Essex Ins. 1862.
Hab.—Gulf States.
2. ORONO, Scudder, Report Peabody Acad. Sci. 1871.
Hab.—Northern States.
3. EGEREMET, Scudder, Proc. Essex Ins. 1862.
Otho, Bois. & Lec. pl. 77.
Hab.—Middle and Western States.
4. OTHO, Abbot, Ins. Ga. pl. 11.
Hab.—Gulf States.

LIMOCHORES, Scudder.

1. MYSTIC, Scudder, Proc. Essex Ins. 1862. Edw. Proc. Ent. Soc. Phil. 1863, pl. 1.
Hab.—New England; New York; Canada.
2. PONTIAC, Edwards, Proc. Ent. Soc. Phil. 1863, pl. 11.
Hab.—Michigan.
3. BIMACULA, Grote & Robinson, Ann. Lyc. Nat. Hist. N. Y. 1867.
Acanootus, Scud. Proc. Bost. Soc. Nat. Hist. 1868.
Hab.—New England.
4. MANATAAQUA, Scud. Proc. Essex Ins. 1862.
Cernes, Harris, Ins. Mass. 2nd Ed. p. 316, 1862.
Hab.—Southern States.
5. CERNES, Bois. & Lec. pl. 76.
Arogos, Bois. & Lec. pl. 76.
Ahaton, Harris, Ins. Mass. 2nd Ed. p. 317, 1862.
? Taumas, Fab. Mant. Ins. p. 84.
Hab.—Colorado and States East of Rocky Mountains.
6. LICINUS, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Texas.
7. ARPA, Boisduval. Bois. & Lec. pl. 68.
Hab.—Gulf States.
8. PALATKA, Edwards, Trans. Am. Ent. Soc. 1867.
Hab.—Florida.

9. BULENTA, Boisduval. Bois. & Lec. pl. 67.
Hab.—Gulf States.

EUPHYES, Scudder.

1. METACOMET, Harris, Ins. Mass. 2nd Ed. p. 317, 1862.
Rurea, Edw. Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—Middle and Western States.
2. ATTALUS, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Texas.
3. OSYKA, Edwards, Trans. Am. Ent. Soc. 1867.
Hab.—Florida; Texas.
4. VERNA, Edwards, Proc. Acad. Nat. Sci. Phil. 1862.
Hab.—Maryland; Virginia.
5. VESTRIS, Boisduval, Ann. Soc. Ent. de Fr. 1852.
Hab.—California.

LERODEA, Scudder.

1. EUFALA, Edwards, Trans. Am. Ent. Soc. 1869.
Hab.—Louisiana; Texas.
2. FUSCA, Grote & Robinson, Trans. Am. Ent. Soc. 1867.
Hab.—Georgia; Florida.

PRENES, Scudder.

1. PANOQUIN, Scudder, Proc. Essex Ins. 1862.
Ophis, Edw. Trans. Am. Ent. Soc. 1871.
Hab.—New England; Florida.
2. OCOLA, Edwards, Proc. Ent. Soc. Phil. 1863. pl. 11.
Hab.—Gulf States.

CALPODES, Hubner.

- ETHLIUS, Cramer, IV, 392.
Chemnis, Fab. Ent. Syst. III. p. 331.
Olynthus, Bois. & Lec. pl. 75.
Hab.—Gulf States.

OLIGORIA, Scudder.

MACULATA, Edwards, Proc. Ent. Soc. Phil. 1864. pl. 1.

Hab.—Georgia; Louisiana.

LEREMA, Scudder.

1. ACCIUS, Abbot, Ins. Ga. pl. 23.

Monoco, Scudder, Proc. Essex Ins. 1862.*Nortonii*, Edw. Trans. Am. Ent. Soc. 1867.*Punctella*, Grote & Robinson, Trans. Am. Ent. Soc. 1867.*Hab.*—Gulf States.

2. HIANNA, Scudder, Proc. Bost. Soc. Nat. Hist. 1868.

Hab.—Massachusetts; New York.

MEGATHYMUS, Scudder.

YUCCÆ, Boisduval. Bois. & Lec. pl. 70.

Hab.—Gulf States; California.

The following species have been described by Scudder and Burgess only from peculiarities in genital armor, and their value is not determined. All belong to the Genus *Nisoniades*. See also Parker, Canadian Entomologist, 1871.

Terentius, Funeralis, Ovidius, Ennius, Propertius, Tibullus, Horatius, Virgilius, Plautus.

SUPPLEMENT.

PAPILIO ALIASKA, Scudder, Proc. Bost. Soc. Nat. Hist. 1869.

Hab.—Aliaska; Hudson's Bay.

PIERIS VIRGINIENSIS, Edwards, Trans. Am. Ent. Soc. 1870; Butterflies of North America, Plate II of Pieris.

Hab.—West Virginia; Ontario, Canada.

PIERIS HULDA, Edwards, Trans. Am. Ent. Soc. 1869.

Hab.—Kodiak.

PIERIS CALYCE, Edwards, Trans. Am. Ent. Soc. 1870.

Hab.—Nevada.

ANTHOCARIS JULIA, Edwards, Trans. Am. Ent. Soc. 1872.

Hab.—Colorado.

- ANTHOCARIS OLYMPIA, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—West Virginia; Illinois; Missouri; Texas.
- ANTHOCARIS HYANTIS, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—California.
- ANTHOCARIS REAKIRTII, Edwards, Trans. Am. Ent. Soc. 1869; Butterflies of North America, Plate I of Anthocaris.
Hab.—California.
- COLIAS MEADII, Edwards, Trans. Am. Ent. Soc. 1871; Butterflies of North America, Plate VIII of Colias.
Hab.—Colorado.
- COLIAS ASTRÆA, Edwards, Trans. Am. Ent. Soc. 1872.
Hab.—Montana.
- ARGYNNIS INORNATA, Edwards, Trans. Am. Ent. Soc. 1872.
Hab.—California.
- ARGYNNIS MEADII, Edwards, Trans. Am. Ent. Soc. 1872.
Hab.—Colorado; Montana.
- ARGYNNIS EURYNOME, Edwards, Trans. Am. Ent. Soc. 1872.
Hab.—Colorado.
- ARGYNNIS BREMNERII, Edwards, Trans. Am. Ent. Soc. 1872.
Hab.—San Juan Island.
- ARGYNNIS HELENA, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Colorado.
- PHYCIODES ORSEIS, Edwards, Trans. Am. Soc. 1871.
Hab.—California.
- PHYCIODES CANACE, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Southern California.
- PHYCIODES CAMILLUS, Edwards, Trans. Am. Ent. Soc. 1871.
? ♀ *Emissa*, *ibid.* 1871.
Hab.—Colorado.
- GRAPTA SILENUS, ♂, Edwards, Trans. Am. Ent. Soc. 1872; ♀, *ibid.* 1870.
Hab.—Oregon; San Juan Island.
- EREBIA RHODIA, Edwards, Trans. Am. Ent. Soc. 1871.
Hab.—Colorado

EREBIA CALLIAS, Edwards, Trans. Am. Ent. Soc. 1871

Hab.—Colorado.

EREBIA HAYDENII, Edwards, in Report of Hayden's Yellowstone Exped. of 1871.

Hab.—Montana.

EREBIA MEADII, Edwards, Trans. Am. Ent. Soc. 1872.

Hab.—Colorado.

SATYRUS CHARON, Edwards, Trans. Am. Ent. Soc. 1872.

Hab.—Colorado.

CHRY SOPHANUS SIRIUS, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Colorado.

THECLA NINUS, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Colorado.

THECLA AUTOLYCUS, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Texas.

THECLA ALCESTIS, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Texas.

LYCÆNA DAUNIA, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Colorado.

LYCÆNA ALCE, Edwards, Trans. Am. Ent. Soc. 1871.

Hab.—Colorado.

LYCÆNA LYCEA, Edwards, ♂, Proc. Ent. Soc. Phil. 1864; ♀, Trans. Am. Ent. Soc. 1871.

Hab.—Colorado.

LYCÆNA RUSTICA, Edwards, ♀, Proc. Ent. Soc. Phil. 1865; ♂, Trans. Am. Ent. Soc. 1871.

Hab.—Colorado

ERRATA.

ARGYNNIS *Mormonia*, Bois. 1869, is MONTIVAGA, Behr, 1863, not *Nenoquis*, Reak.

PHYCIODES *Orsa*, Bois. 1869, is MONTANA, Behr, 1863.

CHIONOBAS *Stretchii*, Edwards, 1870, is SATYRUS RIDINGSII, Edw. 1865.

LYCÆNA *Cilla*, Behr, 1867, is TEHAMA, Reakirt, 1866.

FOR VICTORINA STELENES, read V. STENELES.

ARGYNNIS ASTARTE, Doubleday, is believed not to be a North American species.

NOTES.

In preparing the Synopsis manuscript names have been omitted and names of species that have been erroneously credited to the North American fauna. As respects the genera, I have aimed at giving those with which our lepidopterists have now for several years been familiar. An exception was necessary in case of the Hesperidæ, a family hitherto greatly neglected and in which material had accumulated to a vast extent, rendering revision imperative. Mr. Scudder has for some years been engaged in this work, and his recently published results I have largely followed.

Pages 1 to 6, 10, 11 and 19, have been reprinted with corrections since their original issue.

PAPILIO ALIASKA.—I have substituted this name for *Machaon*, considering the American insect to be sufficiently distinct from the European to entitle it to a specific name, as pointed out by Mr. Scudder.

PAPILIO CALVERLEYII.—The individual described by Mr. Grote was a male and seemed to be a variety of *Asterias*, rather because of its similarity of shape, and from its having been taken where *Asterias* was a common species, and from the fact that in so well worked a district as Western Long Island nothing approaching it had before been seen. It was regarded as one of those extreme variations occasionally seen among the butterflies. I have examined the fine female taken by Mr. Mead, high up the St. John's River, Florida, and certainly cannot undertake to pronounce it a variety. It is as distinct in all respects except in shape from *Asterias* as is *Turnus*. If it is a mere variety, no better illustration of the origin of a species is needed. It is not improbable that this butterfly is common enough in southern Florida, which is a terra incognita to lepidopterists. That an individual should have been found on Long Island is less remarkable when we consider how many strictly southern insects and birds have been found there while unknown upon the adjoining main land.

THECLA LIPAROPS.—By reference to the original unpublished drawings of Abbot, in the British Museum, Mr. Scudder has ascertained that this species was intended by Boisduval and Leconte to represent the butterfly described by Harris as *Strigosa*. How utterly unlike the latter as delineated in this Volume a glance will show. On comparing the description in Boisduval and Leconte with the insect, and then with their plate, it is evident that the description *was not drawn from the former, but from the plate*, which is so wretched an attempt at copying

Abbot that nothing less direct than Mr. Scudder's statement would establish the fact that it was intended to be a copy. For forty years the species has puzzled lepidopterists, nothing like that plate having been seen in nature. It seems to me beyond doubt in such case that no right can attach to the description or plate in Boisduval and Leconte, and that the name given by Harris should be retained.

PHYCIODES ISMERIA.—The case of this species is parallel to that of *Liparops*, and we are now told that the figures in Boisduval and Leconte are meant to represent *Carlota*, Reakirt. These figures likewise purport to be copies from Abbot, but give no idea whatever of the butterfly. The description is made up in same manner as that of *Liparops*, and on same grounds I think the name *Ismeria* should be discarded and *Carlota* retained.

There are enumerated in the Synopsis 509 species, of which, previous to 1852, 137 were known to belong to the then United States and British America. Between 1852 and 1860, 61 species were added, and since 1860, 311.

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